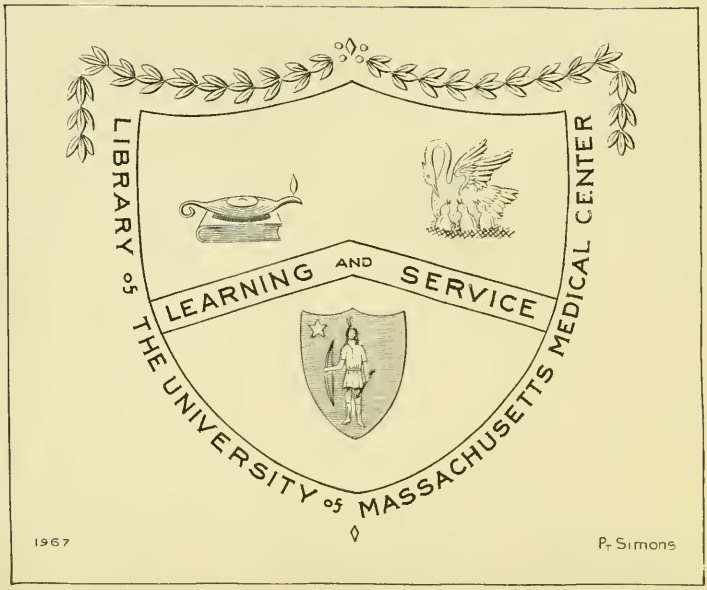
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MDCCCLIII.

A MANUAL

OF THE

NERVOUS DISEASES OF MAN.

BY

MORITZ HEINRICH ROMBERG, M.D.

PROFESSOR OF MEDICINE AT THE UNIVERSITY OF BERLIN,
ETC. ETC. ETC.

WL 425 Gem 1846

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VOLUME I.

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TO HIS EXCELLENCY

ALEXANDER VON HUMBOLDT,

ON THE OCCASION OF

THE FIFTIETH ANNIVERSARY

OF

HIS EXPERIMENTS ON THE IRRITATION

OF THE

MUSCULAR AND NERVOUS FIBRE,

This Volume

IS INSCRIBED, WITH PROFOUND ADMIRATION,

BY

MORITZ H. ROMBERG.

EDITOR'S PREFACE.

The reputation as a neurologist which Dr. Romberg has established for himself in Germany, is of a character in itself to justify the publication of his chief work, incomplete though it is, in the English language. If the translator has succeeded in giving to the thoughts of the foreign author a suitable form, he does not fear but that his readers will coincide with the prevailing opinion as to the value of Dr. Romberg's observations, as well as of the deductions to which he has been led.

The English reader will be gratified by the predilection which the author shows for the physiologists and pathologists of our country; and he will, at the same time, feel constrained to admit, that the practical character which is said to distinguish British men of science, peculiarly stamps the work of Dr. Romberg. His manly and energetic zeal in the prosecution of his physiological and pathological inquiries, and his cordial and undisguised contempt of the fashionable quackeries, will equally establish his claim to the eminent respect of his medical brethren on this side of the German ocean. Dr. Romberg states himself explicitly to belong to that school which bases the study of pathological phenomena upon physiology; and he warns against the tendency prevailing, both abroad and in this country, to seek for all explanations of diseased action exclusively either in the chemical changes occurring in the fluids and solids during life, or in the manifestations of morbid change as presented in the dead-house. Dr. Romberg has devoted himself for a long series of years to the special study of nervous diseases; and we cannot better show the extensive basis of observation upon which the present work has been con-

structed, than by the following statement of the opportunities which have been offered to him for inquiry. It is an extract from a letter written by Dr. Romberg himself:

"In 1817, after having completed my studies in Berlin under Professors Rudolphi, Hufeland and Horn, and in Vienna, where I enjoyed the intimacy of Peter Frank and Hildenbrandt, I already selected the study of the diseases of the nervous system for the object of my life and the goal of my researches. It was in the writings of English authors that I found instruction. I at that time translated and edited with annotations, Marshall's 'Anatomy of the Brain in Mania.' I availed myself of the opportunities afforded in our large hospital, la Charité, of examining all the patients labouring under cerebral disease, and the results I obtained I published thirty years ago in the various medical periodicals of Horn, Nasse, and others. The researches of Sir Charles Bell filled me with enthusiasm, and in 1831 I translated his great work, and made known to my professional brethren in Germany his investigations, which will ever serve as models of scientific inquiry. I had extensive opportunities of examining patients during life and after death. For twenty-eight years I was physician to one of the largest unions in Berlin, in which, on an average, 2000 patients presented themselves annually; among these were a large number of nervous patients, most of whom I presented to my pupils in the lectures which I have delivered in the University since 1834. Some of the results of these investigations have been laid down in my academical Essays, (Neuralgiæ Nervi Quinti Specimen, De Paralysi Respiratoria, De Hæmorrhagia Cerebri.) In 1840 I was appointed director of the clinical wards of the University, which had formerly been under the superintendence of Hufeland. From 1500 to 2000 patients apply there annually, and among them there are many nervous patients. Two volumes of clinical results and observations bear testimony to this fact. In addition to this, I have to mention the circumstance of my enjoying an extensive private practice, in which the most interesting cases of nervous disease are brought to my cognizance.—I should not omit to state, that during the first three epidemics of cholera, the largest hospital in Berlin was intrusted to my superintendence, and that I have published the results of my observations in

notes attached to a translation of Scott's 'Report of the Madras Presidency,' and in papers of my own in Hufeland's 'Journal,' and in Casper's 'Wochenschrift.'"

The above contains sufficient proof of the estimation in which Dr. Romberg is held in his own country. The following responsible appointments, which he now holds, further show that his merits are duly estimated by his government: he is Regius Professor of the University of Berlin, Director of the Policlinique of the University, and Member of the Supreme Court of Examiners, in which capacity he examines all the physicians who settle in the Prussian dominions at the Charité. As a matter of course, he is Knight of a Prussian Order. It is only by untiring industry that even a man of grasping and powerful intellect could fill the duties of these offices, and still retain time and vigour to execute literary work such as that before us; the extent of personal inquiry and historical acquirement displayed in it, can only be appreciated on perusal.

The present work has already passed through two editions in Germany, and a third is being prepared. In the original it is published in one volume, which in the translation would have proved too bulky, so that it has been thought more appropriate to bring it out in two volumes. Together they treat of two great divisions of nervous diseases,—the diseases of Sensibility and those of Motility. The second original volume will, as we are informed by Dr. Romberg, treat of the following subjects:—1. The diseases of the mind. 2. The diseases of the nutritive sphere of the nervous system. 3. The diseases of the formative foci of the nervous system, inflammation, morbid growths, &c. 4. The comparative pathology; and 5. The general pathology of neuroses.

Whether or not the Council of the Sydenham Society may eventually determine to publish the continuation of the work, the subscribers will find the present volumes complete in themselves; a scientific rationale of those diseases in which sensation and motion are exalted or diminished, with the therapeutic proceedings which have found favour in the author's eyes.

It remains for me to add, that as far as possible the quotations of authors have been given from works accessible to English readers. I have referred to the English originals, where Dr. Romberg cites German translations; or where

Foreign works are adduced, I have quoted the English versions. I have introduced a few short notes explanatory of terms or drugs, or therapeutic proceedings not commonly known among ourselves; and it has also been thought advisable, for the purpose of facilitating reference, to employ rather a different arrangement of the sections and headings from that adopted in the original, but without in any way altering the context itself.

As regards myself, I am free to confess, that the labour that I have bestowed upon the new costume in which the work appears, has been the source of much gratification and instruction. I sincerely hope, that the trust which the Council of the Sydenham Society have now, for a second time, reposed in me, may not be betrayed; and that the reception that Dr. Romberg will meet in this country,—a country we might almost say of his adoption,—will not be chilled by the manner in which he is introduced.

E. H. S.

Bentinck Street,
Manchester Square.

AUTHOR'S PREFACE

TO THE

FIRST EDITION.

"I FEAR it will be a long time before combined efforts will enable a medical author to arrange and accurately describe the Diseases of the Nervous System. The position we at present occupy is but a very inferior one." Such was the opinion of Sir Charles Bell. A decennium has since elapsed, many labourers have been at work, we have a rich treasury of materials, and yet we possess no work on Nervous Diseases which meets the present requirements of science. The blame lies in a measure with the distinguished members of our profession who have been deterred by a fear that pathological investigations would fail to cope with the advanced state of physiological inquiry; in others, the fault is to be attributed to that mental indolence, which gives the preference to the easy path of tradition, and with foolish scepticism rejects everything that is new. But in no department of pathology has physiology exerted so great an influence, no where has free research achieved so glorious a victory over dull, traditional routine, as in the doctrine of Nervous Diseases. The present work, the fruit of twenty years of research, is intended to afford evidence of this fact. I feel assured of the existence of numerous defects and errors, as I know that it will only serve as a stage of transition to more perfect works; but the foundation upon which it has been constructed is not to be shaken, as it is *the physiological principle;* this is based upon the unchangeable functions of the animal economy, which are elevated above the influence of great disturbances; and it has that in common with everything that is great and good in science, that it bears in itself the germ of perfectibility.

It is the more necessary to provide ourselves with such support at a time when shallow dilettantism seems to be usurping the place of rigid scientific inquiry. It is the surest way to guard against an error, which medical inquirers have been more guilty of than other students of natural science, that they have attempted to confound that which is accessible with that which is inaccessible to human research. The doctrine of nervous diseases has ever been peculiarly subject to this species of abuse; I have carefully avoided increasing the unknown range, by adding anything that was untrustworthy. I have been averse to anticipating the reader's judgment, by premising doctrinal considerations, which are but too apt to interfere with an unbiassed analysis of facts; general pathology is the keystone of the arch of which special pathology forms the foundation. This much is necessary to justify my departure from the ordinary construction of manuals.

I have retained the same division of the nervous diseases which I have followed for a series of years in my lectures delivered in the university; it is determined by the attributes of the four nervous levers of the organism; accordingly the subject will be considered under the following four heads: the Neurosis of Sensibility, the Neurosis of Motility, Logo-neurosis, and Tropho-neurosis. The delineations of the individual diseases have been taken from cases observed by myself, whenever this was feasible; they are unsoiled by the dust of tradition. I have been at great pains to exhibit the results obtained by surgical observation and experiment as the prototypes of complicated pathological conditions. It was not a part of my plan to introduce historical and literary disquisitions, although I have never neglected the duty of giving every one his due.

My desire is, that practitioners, who are able to dispense with an accumulation of formulæ, may derive benefit from the following investigations. But it is my ardent hope, that this book may be found by students of medicine, not only a source of instruction, but that it may stimulate them to inquiry, in order that fresh forces may be brought to bear on the great aim which we must seek to achieve, *the emancipation of medical science from the trammels of mere mechanical technicalities.*

BERLIN; *September*, 1840.

PREFACE

TO THE

SECOND EDITION.

March, 1851.

The hope expressed in the Preface to the former edition, has been only partly fulfilled. The majority of students have been attracted by the school which seeks to base the science of medicine exclusively upon pathological anatomy and chemistry. This has given rise to new errors, as the doctrine of the crases most clearly shows. The study of nervous diseases, which some persons have refused to acknowledge as anything but the manifestation of other morbid processes, has been declared a fruitless research, and in some schools has been almost interdicted. If this was the case in the universities, matters were necessarily in a worse condition in daily life. Practitioners chased an illusion and caricature, called spinal irritation, with which they satisfied their craving for explanation, and condensed neuropathology into a space which could be covered with the tip of a finger. To guard against greater debasement, we must enter anew upon the path which the master-mind of Charles Bell, the Harvey of our century, has opened to us.

Let our guide be the analysis of observation, not the cavilling spirit which even attacks the solid basis of physiological laws, such as the law of eccentrical phenomena, or the law prohibiting one nerve from acting for another,—but that purifying criticism which lays bare defects, and mercilessly eradicates fallacies and untruths. He who is rigorous against his own delinquencies, may be permitted to expect the same of others; I still fear not to have sufficiently watched over myself.

I have termed the present an altered edition; it has not only been improved by the addition of important results of recent research and observation, but has been abridged by the omission of whatever appeared insufficiently supported. Medical literature especially demands the erasures of the censor;—so long as manuals continue to be asylums for the sensibilities and sophisms of authors, medicine will continue remote from truth.

Dr. ROMBERG.

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DISEASES OF THE NERVOUS SYSTEM.

CLASS I.

NEUROSES OF SENSIBILITY.

CHAPTER I.

That vital process by which an abnormal variation in the excitability of the centripetal nerves is produced, may be termed a neurosis of sensibility.

The activity of the centripetal nerve is manifested by the aid of the brain, as a conscious sensation; by the intervention of the spinal cord, or ganglionic system, as reflex action; it may be either excessive, when we call it hyperæsthesia, or below the average, when it becomes anæsthesia.

The varieties dependent upon difference of locality may be classed according to these two categories. Sensation differs according to the peculiar activity of the nerve of sensation; the same difference presents itself in the neuroses of sensibility. Whether a cutaneous nerve, or a nerve of sensation supplying a muscle or an organ of sense, be affected, each retains the peculiar sphere of sensibility in disease with which it is endowed in health.

It is also important to distinguish according as to whether the seat of disease be peripheral or central; but in making the distinction, it is necessary that the term peripheral nerve be correctly interpreted, and not confined to the ultimate terminations of the nerves. A nerve must be considered *peripheral* from the point at which it quits the central organ to its extreme

distribution. What is called the root of the nerve, or more correctly its point of insertion, is but a portion of the peripheral distribution. By taking this view, the doctrine of the hyperæsthesiæ and the anæsthesiæ obtains a more extensive signification; the mere examination of the superficial nerves cannot, as it has hitherto done, suffice, but it becomes the more imperative to examine the fibres traversing the osseous canals, or passing over the brain and spinal cord, as distinct characters indicate the seat of disease in different divisions of the peripheral tract. The nerve can only be considered *central* within the ganglia, the spinal cord, or the brain, where its fibres are surrounded by ganglionic corpuscles, and are in part merged in them. It is necessary to base the doctrine of the neuroses of sensibility upon the physiological laws governing the nerves of sensation. These are:

First, the law of isolated conduction; that nerve-fibre only presents exalted or diminished action, which is affected by the irritating or depressing cause; and the adjoining fibre, though in ever such close approximation, is not implicated. This law meets with no exception in the peripheral tracts. In regard to the central organs we must also adopt,

Secondly, the law of the sympathy or irradiation of sensations; here the irritation is propagated from the fibre originally excited to other centripetal nerves.

Thirdly, the law of eccentric phenomena; every sensation, as it becomes perceptible to consciousness, is referred to the periphery of the sensitive fibre, the entire tract of which, from its commencement to its terminal point, is susceptible of the impression. It is to be regretted that surgical operations have not been rendered more available for the determination of physiological questions in the manner adopted by Sir C. Bell. They are peculiarly adapted to the illustration of these laws, because, viewed as experiments, and being performed in the majority of instances upon individuals in a fair state of health, they afford clear and trustworthy results. The following case, which occurred in 1846, in the wards of my esteemed friend, Professor Jüngken, and which was taken down at my request by my former pupil, Dr. Marcus, may serve as an illustration of the law of eccentricity.

A labouring man, aged 33, of robust constitution, was affected by an aneurysm of the popliteal artery, brought on by carrying heavy loads up a ladder. It was at first of the size of a bean, and accompanied by lacerating pains, but in consequence of maltreatment by stimulant embrocations, it increased, within three weeks, to the size of a fist; the pains at the same time became agonising, but were invariably interrupted by applying pressure to the femoral artery. The vessel was tied according to Hunter's method. After the operation no difference was perceptible in the limb, though pulsation had entirely ceased. For two hours the temperature, the motion, and sensation of the limb remained unaltered, and the pains had entirely ceased. The warmth of the extremity then gradually disappeared, from the toes upwards; the patient complained of a sense of formication and numbness in the foot, and especially in the toes, and of very violent pains darting periodically through the sole. These ceased on the removal of the compress that had been applied to the tumour, but returned with renewed violence on accidentally pressing the aneurysm at the point traversed by the popliteal nerve; the patient screamed loudly, "my toes!" and involuntarily moved the foot. The pressure was intentionally repeated several times, and invariably followed by the same phenomena. Seven hours after the operation, the foot felt cold up to the ankles, was somewhat damp, and entirely insensitive to external impressions, by pricking or pinching. The patient averred, that he could not possibly move the foot, though when requested to make the attempt, he was able to extend and flex his toes; when he did so, he inquired whether he was moving the foot, which he was unable to see, and repeated the assurance that he was perfectly unconscious of doing so. Burning pains recurred from time to time during the night, in the sole of the foot. On the succeeding day a sense of deadness was manifested in the leg as far as the knee; the wound, and the parts above the knee, were painful. The movement of the toes was facilitated by directing the attention to them, and especially if the toes of the opposite foot were moved at the same time; the patient was not, however, conscious of the movement on the affected side. This condition remained unaltered on the second day after the application of the ligature, except that strong

pressure of the fourth and fifth toe produced a peculiar pricking sensation in the hip. Gradual improvement ensued on the third and fourth days; the pains ceased, the anæsthesia of the foot disappeared, and the patient felt the pressure of the finger, though he was unable to determine the point upon which it was exerted. Strong compression of the toes also caused a pricking sensation in the heel. The foot could be moved, not only voluntarily, but even with consciousness. The temperature of the foot, though wrapped up in flannel, remained lower than that of the opposite side when uncovered. When pressure was applied to the external side of the already diminished tumour, violent pains were still suddenly excited in the sole and toes, disappearing with the cessation of pressure, but leaving a sense of numbness.

If we may adopt the laws of conduction regulating centripetal nerves as applicable to and illustrative of neuroses of sensibility in reference to *space*, (for which modern physiologists have adopted the terms longitudinal and transverse conduction,) the question suggests itself whether the relations of conduction as to *time*, which cannot be determined by experiment upon living animals, can in any way be demonstrated by reference to morbid states.

The rapidity of centripetal conduction is evidenced by the manner in which we become conscious of sensation, or in which reflex action is excited. The commencement and termination of the period of conduction, as in a prick of the skin, or winking from irritation of the conjunctiva, appear to coincide. It will ever be impossible to calculate it, as we do the velocity of electricity in a copper wire, on account of the part the brain takes in sensation in one case and the muscular tissue in the other: for the same reason no rule can be laid down for it. We are more likely to determine it in morbid conditions: thus, in incomplete anæsthesia, the susceptibility of impressions made upon sensitive nerves is not only obtuse, but also retarded; and as the diminution of sensibility is often unilateral, we obtain a definite indication of the period of conduction by comparison with symmetrical nerves. Cruveilhier[1]

[1] Anat. Pathol., livr. xxxviii, p. 9.

has made the observation that as much as 15 to 30 seconds may elapse before a sensation is excited, and that in some patients the impression must be several times repeated before it can be perceived. The period might be determined with greater accuracy by employing a toothed wheel making a certain number of revolutions in a second (say 50 or 100), and by comparing the number of impulses required to produce isolated impressions in healthy and in diseased parts. In such experiments, consciousness must be in a state of perfect integrity.

CHAPTER II.

HYPERÆSTHESIÆ.

The character which these affections have in common, is exalted irritability and increased irritation of the sensitive or centripetal nerves. The expression of this irritation is either psychical, one of consciousness, a sensation,—or motor, a reflex movement—or both at the same time.

The sensation varies according to the peculiar sphere of the affected nerve. Hyperæsthesia of the cutaneous nerves is manifested by pain in its various modifications; that of the nerves of special sense by phantasms. The part taken by the brain as the psychical organ, in sensation, is not only receptive, but also reactive. If the imagination dwells upon the sensation, the latter becomes more intense and more defined; the power of imagination may create sensations, as proved by the feeling of nausea or prurigo, and a morbid condition termed hypochondriasis. Dreaming and insanity differ from unfettered consciousness, in their interpretation of centripetal action, by an absence or estrangement of self in the perception of sensations: evidence of this is presented to us in nightmare and hallucinations.

The second manifestation of exalted irritability of the centripetal nerve takes place by reflex action upon the motor apparatus, in which case sensation may be absent or it may continue. In the former case, the absence of accompanying sensation increases the difficulty of forming a correct judgment; but we may satisfy ourselves of the real character of the affection by observing that the gentlest irritation of centripetal nerves, which in ordinary conditions would produce no effect, at once rouses reaction amounting to violent spasmodic action, such as we see in poisoning by strychnine, in tetanus, or hydrophobia. The combination of sensation and reflex action, as often exhibited in hyperæsthesiæ, of the cerebro-spinal, and more particularly in the sympathetic system, allows of a more

easy interpretation. Thus, in ciliary neuralgia or photophobia, the eyelids are closed by reflex action, communicated by the sensitive fibres of the trigeminus to the motor fibres of the facial nerve. In sciatica, pain occurs in combination with cramps in the calves and spasmodic action of the leg. In the case of prosopalgia with neuralgia of the tongue, which will be detailed in a future chapter, reflex action was communicated to the hypoglossus, and in consequence of this the tongue was thrown about. Numerous instances present themselves, in connection with hyperæsthesiæ of the sympathetic. Under this head we class disturbance of the rhythm of the heart's action from cardiac neuralgia, intestinal spasm, and ischuria accompanying mesenteric neuralgia. Nor is it only in the muscular tissue that hyperæsthesia is manifested by reflex action; the same is the case in other contractile tissues: but it is a subject to which hitherto little attention has been devoted. Thus it may show itself in the skin; for it is not unusual for the hair in hemicrania to be elevated at certain painful parts. A further relation between hyperæsthesia and motor action is exhibited in the aura epileptica; phantasms, vertigo, and especially abnormal sensations of a current of air, or more frequently of tearing, dragging pains, which mount up from some point of the trunk or the extremities to the head or the adjoining parts, where they seem to be cut off, and are immediately followed by spasms. Epileptic attacks most frequently, and not unfrequently hysterical paroxysms, are introduced in this manner. Even tetanic and hydrophobic spasm occasionally commences with an aura at the seat of injury.

In hyperæsthesia we find that not only the irritation is increased, but that also the irritability of the nerves of sensation generally is exalted, both during the paroxysms as well as in the intervals. During the paroxysms it shows itself by the extent of the sympathetic action, such as takes place, for instance, in the hyperæsthesiæ of the sympathetic system and in hysterical affections. In the intervals it manifests itself partly by a derangement of sensibility, as in tenderness or numbness of the neuralgic parts, partly by the abnormal reaction to external stimuli, or to irritation proceeding from the organism. Thus, neuralgic patients exhibit an unusual sensitiveness to atmospheric influences of an electric or hygrometric character,

whose approach they are thus able to foretell. Hugh Ley[1] has made the observation that leechbites induce erythema and ulcers in the skin of neuralgic subjects. We may also quote, in proof of our position, the trifling nature of the cause which occasionally gives rise to the paroxysms, and the contrast in the effects produced by these causes in different individuals. It is this exalted sensibility, upon which the change in the relations of the organism in hyperæsthesia depends, that distinguishes morbid processes from mere physiological activity of a stimulated nerve. Our acquaintance with these phenomena is not as yet sufficiently extensive; but their study will be advanced by accurate observations of the free intervals occurring between the paroxysms.

If we turn from the physiological to the nosological features of hyperæsthesia, we observe that the following characters are applicable to the entire class: 1. Periodicity, the alternation of paroxysms and intermissions. 2. Uniformity and persistence of the symptoms, however long the duration of the disease. 3. Absence of danger to life. 4. Freedom of early life from the disease.

We know little of the anatomical characters of hyperæsthesiæ; nor can it be expected, as these affections rarely end fatally, and an opportunity for a post-mortem examination seldom presents itself. We must also remember that the law of eccentricity was formerly unknown, and that the seat and cause of the disease were only sought for in the superficial ramifications; the pathologist not meeting with palpable changes, was contented to seize upon cadaveric infiltration of the nerves with blood or serum, as a morbid change. Besides it demands extreme care in the investigation, as well as more enduring devotion to this subject than is usually met with, to discover microscopic alterations, or even to find a tubercular deposit of the size of a millet seed in the fibres of a nerve of sensation.

The etiology of hyperæsthesia has only been imperfectly ascertained. As regards age, the middle period of life presents the greatest predisposition, and old age very little, whilst childhood is entirely exempt. The two sexes have each a separate proclivity to certain forms; the male sex is exclusively subject

[1] An Essay on Laryngismus Stridulus or Croup-like Inspiration of Infants. London, 1836, p. 306.

to hypochondriasis, whilst females are mainly liable to hemicrania, intercostal neuralgia, and mastodynia neuralgica. Little hereditary predisposition exists, except in regard to hemicrania. Atmosphere and soil have a marked influence. An epidemic occurrence of acute forms of neuralgia, with a definite type, has been repeatedly observed of late. An increase in their frequency is often noticed when intermittent forms prevail: thus, malarious districts are fertile in neuralgic complaints. The influence of climate has not as yet been determined. Atmospheric changes, wind, storm, thunder and lightening, continued heat or cold, all are exciting causes. Some substances appear to have a specific effect in producing hyperæsthesia: thus lead causes neuralgia, spurred rye and veratrine produce formication, morphia gives rise to pruritus, and the inhalation of protoxide of nitrogen to optical hyperæsthesia. Of the causes seated in the organism itself, the blood plays the most important part. Plethora as well as anæmia are followed by vertigo, optical and acoustic hyperæsthesia. Anæmia, especially in the female sex, is the most frequent basis of hyperæsthesia; it seems as if pain were the prayer of the nerve for healthy blood. Congestion of the brain from hypertrophy of the left ventricle induces vertigo, and optical and acoustic illusions. Obstruction or cessation of habitual hæmorrhages, especially of the catamenia, is a frequent cause of hyperæsthesia. Matters secreted from the blood may also give rise to this class of affections. The attention of the older physicians was almost exclusively directed to the secretions of the skin, the liver, and the intestinal glands; recently we have become acquainted with the relation of the renal secretion to nervous diseases in general, and we have learnt the influence exerted by the elimination of oxalate of lime and the phosphates upon spinal neuralgia and hypochondriasis. Among the diseases predisposing to hyperæsthesia, hysteria occupies the first rank; rheumatism, gout, hæmorrhoids, carcinoma, impetiginous affections, whether undeveloped or evolved, or interrupted, are frequently at the bottom of the evil. The changes produced by these and other pathological states, such as syphilis and scrofula, though mere residues of an extinct process, may maintain the hyperæsthesia; swellings of osseous and cartilaginous tissues, through which nerves of sensation take their course, may act in this way, and

give rise to actual incarceration. Dilatation of the vessels accompanying sensory nerves in their passage through cranial or intervertebral apertures produces a similar effect, as well as distension and repletion of hollow organs, as in the production of neuralgia of the lower extremities by accumulation in the colon.

An especial mention must be made of tumours attached to the nerves themselves. This leads to the question, how increased action of the nerve of sensation is induced by pressure. It can only be if, at the same time, there is irritation and traction of the fibres; consequently, it is much more frequent in interstitial tumours, though their bulk be ever so small, as in painful tubercle, than in large neuromatous growths, over which the sensitive fibres may be spread fanlike, and be stretched to the utmost without marked derangement. I have raised and stretched the thick infra- and supra-orbital nerve of horses on the handle of a scalpel, like a string on the bridge of a violin, without exciting the least evidence of sensation; but as soon as mechanical or chemical irritation had given rise to inflammation of the nerve, a gentle touch caused violent pain. Compression of a healthy nerve of sensation, by the tumefaction of adjacent parts, interrupts conduction and induces anæsthesia. If the same nerve becomes inflamed or ulcerated, pressure causes severe pain, as we occasionally see in aneurysms; of this Morgagni[1] gives an illustrative instance.

Knowing as little as we do of the causation, it would be of no use to construct an etiological diagnosis, and, for instance, to determine, as has been attempted, the character of the neuralgia from the character of the pain. Observers have not been sufficiently discriminating even in this matter; for irritation of healthy nerves and sympathetic sensations have been misinterpreted as evidence of hyperæsthesia. For the same reason we are not justified in adopting a classification based upon etiological relations; for the alleged practical utility of such a system is destroyed by its utter untrustworthiness. We must take our nosological principles, if they are to be tenable, from the laws of physiology; it is only thus that they can attain permanence and perfection. The range of these diseases in this way obtains a different and larger extent than presented

[1] De sedibus et causis morb.; epist. i, art. 55.

by former systems. The divisions of the following arrangement are adopted according to whether the irritation affects the peripheral tracts of the nerves or the central apparatus, or according to the peculiar action of the sensitive nerve. We propose to treat of the conscious hyperæsthesiæ, of those which present an expression of sensation, in this section. Those which the individual remains unconscious of, and are manifested by motor reflex action, will be placed among the neuroses of mobility.

First Order. — Hyperæsthesiæ from Irritation of the Nerves.

The physiological criterion of peripheral hyperæsthesiæ lies in the rule of isolated conduction on the side of the injury.

1. Cutaneous hyperæsthesiæ. Neuralgia. Pruritus. Ardor.
2. Muscular hyperæsthesiæ. Neuralgia muscularis. Vertigo.
3. Hyperæsthesiæ of the vagus. Gastrodynia neuralgica. Bulimia. Polydipsia.
4. Hyperæsthesiæ of the special senses. Hyperæsthesia optica, acustica, olfactoria, gustatoria.

Second Order.—Hyperæsthesiæ from Irritation of the Central Organs.

The physiological character of these affections is marked by communicability and translation of the conditions of irritation to other sensitive and motor fibres. This serves to distinguish the sympathetic ganglia from the ganglia of the spinal cord, the ganglion of the fifth pair, and the ganglion of the vagus.

1. Hyperæsthesiæ of the sympathetic ganglia.
   - *a.* Hyperæsthesia of the cardiac plexus.
   - *b.* „ „ solar plexus.
   - *c.* „ „ mesenteric plexus.
   - *d.* „ „ hypogastric plexus.
   - *e.* „ „ spermatic plexus.
2. Hyperæsthesiæ of the spinal cord. Spinal neuralgia.
3. Hyperæsthesiæ of the brain; conduction takes place in a crucial direction, *i. e.*, the phenomena are manifested on the side opposite to the seat of injury. Cerebral neuralgia. Psychical hyperæsthesiæ.

Hyperæsthesia generally runs a chronic course. Many of its forms grow old with the individual affected. They are marked by a periodic character, an alternation of paroxysms with longer or shorter intervals, and they have a uniform or varying type. They rarely terminate in complete recovery; slight derangements of sensibility and a tendency to relapse continue for a long time. They may pass into morbid conditions of the same, or of other parts of the nervous system. Thus, peripheral neuralgic affections, especially when originating in traumatic causes, gradually extend their range by implication of the central organs; and what at first was mere sympathy is thus converted into a positive neuralgic disease. Irritation of nerves of sensation by foreign bodies, morbid growths, or dragging cicatrices, occasionally induce epilepsy. Hyperæsthesiæ of the nerves of sense, especially of the optic nerve, may be followed by insanity.

We do not possess positive proof of the transition of hyperæsthesia to organic derangement; still it may be assumed with much probability to take place. Even during the neuralgic paroxysm, certain phenomena in the circulation and secretion are known to occur. Thus the paroxysms of facial neuralgia are accompanied by flushing, heat, secretion of tears, or saliva, and increased pulsation of neighbouring arterial trunks. Earle,[1] to whom we are indebted for instructive observations, in a case of supra-orbital neuralgia, saw a well-defined red streak in the course of the nerve developing so much heat, that cold applications rapidly evaporated. In the case of a widow, who for years had been affected with neuralgia of the inferior maxillary branch of the fifth pair, every paroxysm was accompanied by violent pulsation in all branches of the superficial carotid, and generally terminated with a profuse discharge of saliva. In neuralgia of the ciliary nerve the eye weeps and becomes red. Intermittent ophthalmia, frequently, is nothing but congestion of the conjunctiva accompanying an intermittent neuralgia of the first branch of the fifth pair. In the case of Mr. F—, of which the details are given in the chapter on Facial Neuralgia (p. 37), whenever the ophthalmic nerve was affected, the eye became bloodshot during the paroxysms, and remained so for some time after, as in severe traumatic ophthalmia; the eye

[1] Medico-Chirurg. Transact., vol. vii, p. 187.

became prominent, and there was tumefaction of the eyelids and copious secretion of tears. Erythema and vesication often accompany punctures of sensitive nerves. I have related a case of the kind myself, and the following may be quoted from Earle's observations. A female, æt. 32, pricked the external cutaneous nerve with a fork about the middle of the forearm. Violent pains ensued in the course of the nerve, followed by considerable inflammation in the vicinity of the wound. Three weeks after the occurrence, the patient while moving the arm, was suddenly seized with violent pains and a burning sensation in the wound. An erysipelatous redness extended over the anterior surface of the forearm, and large blisters formed as in pemphigus. The heat of the arm was very considerable. Perfect quiet and opiate fomentations rapidly restored her; but soon after, on making a renewed attempt to move the arm, the paroxysms returned. The temperature of the arm was three degrees higher than it was under the tongue. The relapse occurred four times from the same cause,—during the last attack, there were no vesications, but there was an eruption resembling urticaria. We shall have occasion to allude to the relations between herpes zoster and neuralgia; its prevailing occurrence on one half of the body, in the course of the intercostal or lumbar nerves, removes it out of the pale of the law of symmetry governing the exanthems. Frequent repetition and permanence of hyperæsthesiæ influence organic formation, and give rise to structural changes. Thus in the further progress of the case of facial neuralgia already alluded to, salivation continued even in the intervals, whilst at the commencement it only occurred during the paroxysms. Neuralgia of the cœliac ganglia often precedes the development of carcinoma of the stomach by many years. In psychical hyperæsthesia the accession of material changes is a matter of pathological and therapeutic importance.

A fatal termination is, as we have already remarked, quite exceptional.

The prognosis, though favorable to the duration of life, is unsatisfactory as to the curability of the affection; few diseases are more obstinate than hyperæsthesiæ, and they are very prone to recur. The intermissions which occasionally take place are so long as to cause an appearance of re-

covery. When the seat of disease is in the peripheral parts, the prospect is more favorable than when the central organs are affected. Intensity and long-continuance of the pains operate injuriously upon nutrition and the general state of health.

The spontaneous cure of hyperæsthesia takes place at times by the aid of critical discharges; neuralgia of the cœliac ganglia may disappear on the occurrence of hæmatemesis and melæna, sciatica or hypogastric neuralgia, with an hæmorrhoidal or uterine hæmorrhage; vertigo may yield to an attack of epistaxis; or similar effects may be produced by metastasis, by means of a paroxysm of gout, or an impetiginous eruption. Hyperæsthesia may also disappear without marked crises or changes—thus hemicrania ceases in advanced age.

The first point to be considered in treatment is the predisposing or exciting cause; but it is rare, and then only when the disease is recent, that the removal of the cause prevents the effects, as in the case of extirpation of neuromata for the relief of neuralgia, of change of occupation in lead colic, change of residence in malarious neuralgiæ. It is generally difficult, and often impossible, to overcome the morbid processes upon which the hyperæsthesiæ are based; and even success in this point does not always achieve the desired object. The change in the irritability of the nerve originating in the sympathetic affection of the cerebral organs generally remains, and renders other modes of treatment necessary; to which we are often obliged to have recourse from the beginning, when, as is too often the case, we are unable to ascertain the cause. An immediate attack upon the nerve suggests itself in the first instance; this has been attempted in a direct manner by division of the nerve in neuralgia, but from ignorance of the law of eccentric phenomena it has generally been ineffective, and has only been satisfactory when the seat of disease was peripheral, as in the case of injury or tumours. Subsequently, acupuncture and electropuncture of the affected nerve were introduced, though without permanent results. Magnetism and electricity by induction were then employed, and again given up. The patient finds some relief in compression, but its benefits are of short duration. Veratrine and aconitine have obtained a reputation as anæsthetic agents, and when

rubbed into the neuralgic part in the shape of an ointment, they frequently afford relief. These and similar means were calculated to operate upon the peripheral tract and the conducting power of the nerve; other attempts were made with the view of suppressing the part taken in hyperæsthesia by the brain, and preventing the consciousness of the sensation. This view is realised by the employment of narcotics, among which opium, and especially morphia, used both internally and endermatically, deserves the preference. During late years we have become acquainted with the inhalation of ether and chloroform as an agent by which the conduction of sensation is weakened and extinguished, and with rare exceptions consciousness is placed in abeyance. The effect, however, like that of morphia, is evanescent and insufficient to prevent the return of paroxysms; it can therefore only serve as a palliative. The co-operation of the brain as the organ of the soul may be called into play in another respect, in the treatment of hyperæsthesia. We have already alluded to the influence of the mind being directed to the sensation; the change in the direction of the attention becomes a question of therapeutic value. We cannot in every patient expect to find the same strength of resolution which the great philosopher of Königsberg, Kant, praised as a remedy against pain, but we may induce salutary changes by exciting new emotions and by transferring attention to the motor powers; thus it may be highly useful to promote voluntary and even laborious movements, even when counter-indicated by the pain; the result will be the more satisfactory if the cause of the hyperæsthesia lies in the brain, as we shall have occasion to see more fully when we treat of hypochondriasis.

This mode of treatment rarely suffices by itself; we must then look for our indications in the relations of the nerves to other organs. This may be found in the vascular systems and the blood, which often play an important part in these affections. Not only are the nerves dependent upon them for nutrition and regeneration, but we may assume that the pulsations of the vessels exert a considerable influence upon the nervous agency, both on account of the vicinity of the nerves and vessels to one another, and of the peculiar apposition of the arteries to the nerves obtaining in many instances; the

rhythmical action thus communicated may be looked upon as a substitute for independent motion of the nerves. The result of applying ligatures to arteries, and of the impermeability of arteries from inflammation or other causes, are evidences in favour of this view; as long as no collateral circulation has been established, anæsthesia is observed in various degrees. Upon these grounds the temporary compression of arteries adjoining the seat of disease may be beneficially applied both during a paroxysm as well as in the intervals; the crural and popliteal arteries may be compressed in sciatica; the temporal in neuralgia of the ophthalmic branch; the carotids in tic-douloureux, vertigo, or tinnitus aurium. Abstraction of blood locally, though not indicated by plethora, has a similar effect, but it is rarely useful except at the commencement of disease; while in the later stages it is calculated to render the paroxysms more frequent and more violent. We obtain a more salutary and more enduring result, especially in inveterate cases, by an agent that operates powerfully upon the blood,—this is iron; its value is undeniable, even in patients who show no symptoms of anæmia.

The continued use of this remedy not unfrequently eradicates entirely the great excitability, by which not only the hyperæsthesia is maintained, but even its transition to other nervous affections promoted. It is necessary to adapt the remedy to the individual patient. Thus, the chalybeate waters, the carbonate of iron, the muriate, or iodide, or the tinctures of iron, may each be more especially indicated in certain cases; and with the administration of these remedies internally the use of baths may be appropriately combined. We possess a powerful agent, which necessarily affects nerves and blood-vessels equally in heat; it is most useful in peripheral neuralgiæ. Thermal baths are peculiarly beneficial in this respect; and they act the more effectually if, at the same time, they affect the cause; thus sulphurous baths are extremely valuable in lead affections. Wiesbaden, Teplitz, Warmbrunn, Landeck, &c., are efficient in hæmorrhoidal, rheumatic, or arthritic constitutions, in which, as modern observations have shown, salt baths are also to be recommended. Artificial baths afford a substitute, though an imperfect one, for the natural waters. In central hyperæsthesiæ the abstraction of warmth

is advisable; cold applications to the head, in the shape of washing or affusion, are commendable for vertigo and psychical hyperæsthesia. To the last-named affection the cold water cure is also generally applicable.

The antagonistic method, which acts by means of derivation and translation, is proved to be effectual, both by ancient and modern experience. It produces its effects by the irritation of other nerves; thus, in hyperæsthesia of the nerves of the senses, we give nauseating medicines, by which we influence the nerves of the stomach; or we seek to increase the action of secreting surfaces, and give purgatives to operate upon the bowels, we employ vapour baths to promote the action of the skin, and diuretics to stimulate the kidneys; or we establish issues to produce fresh discharges.

However much labour and trouble we may expend upon this mode of treatment, which is designated the rational system, it often fails, and we are thrown back upon empiric remedies. This is no reproach; for the most trustworthy remedy in intermittent hyperæsthesiæ, the vegetable and mineral antitypics, quinine and arsenic, are no better than empiric. We must, however, exert our critical acumen, be sparing of praise, and mature our observations; there is much in the waste-pan of materia medica which at some time has enjoyed a large reputation. Specific powers have been attributed to turpentine, arsenic, and nitrate of silver. We shall examine the nature of their claims upon our confidence in the following pages.

CHAPTER III.

HYPERÆSTHESIA OF THE CUTANEOUS NERVES.

The expression of this variety of hyperæsthesia consists in a sense of pain, itching, formication, and heat; pain is the most frequent symptom, and for this reason the term *neuralgia* has been used to designate it. These sensations come on in paroxysms, and are confined to the distribution of one or more cutaneous nerves, of one or occasionally of both sides of the body.

Injuries of the nerves may serve as types of this affection, because they may, as surgical operations generally, be looked upon in the light of experiments which afford a more distinct interpretation of simple conditions.

Neuralgia from injury of a nerve may be known by the pain commencing at a definite point in the course of a nerve, by its distribution to the peripheral terminations of the nerve, by excitement or exaltation of the pain by the slightest touch of the injured part, and by cessation of pain when compression is applied above the seat of injury. Sooner or later sympathies in other nerves, not only in the vicinity, but also at a distance from the original seat, show themselves, and if the pain continues for a long time a constitutional disease is developed.

Punctured wounds, cuts, bruises, and foreign bodies are the most frequent causes. The pain occurs in paroxysms, and is produced or increased by change of weather, affections of the mind, and errors in diet.

The purest form of neuralgia is seen when the injury affects very sensitive nerves, such as the subcutaneous nerves; it becomes blended with symptoms of a motor character, when those causes are seated in a nerve containing sensitive and motor fibres.

Cases.—A young lady, aged 16 years, while engaged in acquiring the art of cookery, pricked the middle finger of the right hand, on the radial side between the second and third

phalanx. Violent pains ensued at once, and inflammation set in some days after with an eruption of phlyctenæ, accompanied by a dusky redness of the hand and forearm. Suitable remedies removed the inflammation, but a painful sensation remained in the point of the finger, which was increased by contact or spontaneously, and frequently induced sympathetic sensations in the hand, arm, neck, and legs of the same side. Whenever the patient becomes otherwise indisposed, the finger is the most painful part. The repeated use of the sea-baths at Norderney has effected a remission, but no cure. At a later period spasms in the distributions of the facial and accessory nerve of the same side supervened.

Wardrop[1] relates the following case: "A young gentleman received a cut with a gun-flint obliquely across the radial side of the distal phalanx of the left thumb. The wound was about two thirds of an inch in length, and so deep as to divide the digital artery. Though accompanied with an unusual degree of pain, it readily healed by adhesion, and being considered of little importance, no further notice was taken of it. The patient, however, returning to his usual habits, and living rather fully, in a few days the thumb became painful, and the uneasy feelings accompanied by constitutional irritation, had greatly increased when I first saw him, which was on the sixth day after the accident. No change could then be perceived in the appearance of the thumb, and the cicatrix seemed perfectly natural, notwithstanding he complained of great pain, not only in the wounded thumb, but also in the forefinger and radial side of the middle finger, which extended up the arm and as far as the neck and side. The pain was constant, and when the wounded thumb was even slightly touched, it became excessively severe. The pulse was frequent and tense, the face flushed, and the tongue white and frothy. A very copious general bleeding gave almost immediate relief, the pain in the arm and back decreasing, and the thumb becoming less painful to the touch. For three successive days all the local symptoms returned, but yielded each time to a repetition of the bleeding, along with copious purging and a strict antiphlogistic regimen. The paroxysms of pain were several times distinctly produced by mental excitement, and on some occasions were brought on

[1] Medico-Chirurg. Transactions, vol. xii, pt. i, p. 205.

by taking even a very small portion of animal food. Opiates gave little relief, and nothing seemed essentially useful but strong purgatives, and living on the most simple liquid food. Three weeks after the accident he was considerably reduced in flesh and strength, and the primæ viæ, whose functions had long been deranged, were now difficult to regulate. The wounded thumb, which was at all times painful and extremely tender to the touch, was sometimes seized with paroxysms of agonizing pain, which was no longer confined to those fingers supplied by the radial nerve, but extended over the whole hand, arm, neck, and even down to the back. In this alarming state the trial of some further means of relief seemed imperative. I thought it advisable to make a complete division of the nerve above the injured part, and the operation was immediately performed by making a deep transverse incision close to the second point. The operation was instantly followed by a complete abatement of all the symptoms; for the thumb, which he could not allow to be touched a minute before, he could now roughly handle, and all pain left the other fingers and hand. The symptoms, however, did not remain permanent, for during several weeks after the operation, whenever he took food of difficult digestion, when purgatives did not readily operate, or when his mind was at all excited, the pain attacked his hand and arm, and sometimes to a very considerable degree. After that time his health became quite re-established, and twenty months have now elapsed since the operation, during which time he has been able to take the most violent exercise in shooting and hunting. The point of the thumb has always remained numb, though not painful to the touch, and what strongly points out the sympathy which sometimes an injured part long preserves with the digestive organs, is that when from any cause this gentleman's stomach is disordered, he feels a pain in the injured thumb."

In this case the first symptoms are those of neuralgia from injury of the nerve affecting its ultimate distribution; shown by pain in the course of the dorsal cutaneous nerves of the thumb derived from the cutaneous branch of the radial nerve, and by increase of the pain from slight external contact. We then meet with the phenomena attributable to sympathy: the patient complained of pain in the injured nerve of the thumb,

derived from the anterior branch of the superficial division of the radial nerve, as well as the index finger, and on the radial side of the middle finger; and there was even pain in the hand, arm, and neck. It is evident that these sympathetic pains are not brought about in the peripheral tract of nerves, for they present no anastomoses by which we can account for such conduction; and besides, it is sufficiently demonstrated by the influence of accidental causes in exciting and increasing the pain: this influence was manifested even after interrupting the connection of the injured nerve with the brain, for whenever the patient was in any way affected after division of the nerve, he complained of pain in his hand and arm. The case under consideration also exemplifies the law of eccentricity. Although the thumb was numbed by the loss of its nerve of sensation, it became painful when the digestion was deranged. The cause here operates upon the central organ, and affects the origin of the cutaneous nerve of the thumb. The sensation thus excited is referred by the rule of eccentric action to the periphery of the nerve, which may be said not to exist, as its connection with the body of the nerve is destroyed.

We find a similar case detailed by Abernethy,[1] and another, which was marked by the most violent paroxysms, by Swan.[2] "Miss W—, aged 23, on the 20th of December, 1822, wounded the ulnar side of the second finger of the left hand, near the middle of the second phalanx, while she was attempting to cut an orange. She was immediately in great pain, which extended over the hand and up the arm, and after some days was continued to the centre of the left breast, and up the left side of the neck to the face, along the branches of the facial portion of the seventh nerve.

On the 26th the wound was nearly healed; the wounded part was tender to the touch, and pain was produced on making pressure beyond the wound, or that part nearest the tip of the finger. There was an insensibility or numbness of the opposite side of the finger, which was very great in the first few days, and then gradually diminished, but never went away. The arm could hardly be moved in any direction without pain, but

[1] Surgical Observations on Injuries of the Head, and on Miscellaneous Subjects, 4th ed.; London, 1825, p. 209.

[2] A Treatise on Diseases and Injuries of the Nerves; London, 1839, p. 129.

this was frequently great when the hand was at rest. Opening the fingers, or stretching the wounded part in any way, produced much pain, but this was excruciating when she attempted to move the limb with the hand in a state of pronation. Whenever she attempted to read, pain was produced in the superciliary nerves of the left side, so that she could not read longer than about five minutes. A poultice was applied to the finger, and afterwards the extract of belladonna and opiates and antispasmodic medicines were given.

On the 11th of January the symptoms continued nearly the same, and as her health appeared to be suffering, I divided the nerve by making an incision across the side of the finger, near the middle of the first phalanx. Immediately afterwards the cicatrix could be pressed without pain, and complete insensibility of that side of the finger was produced. She could move her hand and arm in any direction without pain, and, in fact, was immediately and completely relieved.

12th. She has had a little pain in the arm and neck, and complains of much pain in the joint between the first and second phalanx, but she can move her arm in any direction without pain, and her feelings are altogether different from what they were before the operation.

16th. Last night she had pains in the neck, which struck chiefly to the back of the ear, but each attack lasted only about five minutes. She has always some pain at the inner side of the arm.

20th. She had some pain in the face on the evening of the 18th, but yesterday it was very severe, and came on like the tic douloureux. The weather was intensely cold; the last wound is nearly healed. She was ordered to take half a drachm of subcarbonate of iron twice a day. This evening she also had violent pain for two hours.

25th. She had much pain in the arm and clavicle, but not so much in the face.

February 2d. She has had pain and tenderness in her right side, below the ribs. She had inflammatory affections of the liver before the accident. She was ordered to discontinue the iron, to have eight leeches applied to the side, and to take four grains of submuriate of mercury at bedtime, and aperient medicines in the morning.

10th. She is in every respect better, and has had very little of the tic douloureux for the last few days. She can move her arm in every direction when the hand is shut, but has pain when the fingers and hand are extended together.

23d. On the evening of the 21st the pain in the arm, neck, and face was very severe, and continued until midnight; there is a small tumour in the cicatrix, which is very tender.

March 5th. She has had bleeding several times from the left side of the nose, and the same pains; she has now much pain in the hand, and particularly in the finger, and the posterior part of this. When the arm is moved with the finger extended, there is pain all along this, but it did not strike up the arm. As her health appeared to be suffering, and as she could not use her hand, and the functions of the nerves of the finger were altogether disordered, the finger was amputated at the joint between the metacarpal bone and the first phalanx. On examining the finger at the original wound, a small fibril of the digital nerve was found divided; the end of this next the lip was incorporated with the cicatrix, the other was formed into a small bulb. At the place of the division of the nerve at the first operation, both extremities of the divided nerve were incorporated with the cicatrix, and likewise those of the dorsal branch, which had also been divided.

8th. She has had a very good night, but had some pain in the neck this morning. She frequently feels the same pain in the finger she did before it was amputated.

17th. When she extends her arm and hand, there is the same pain in the finger as before the amputation.

21st. Her general health continues to improve, but she has had pain in the hand, arm, and neck. The wound is quite healed, but there is still tenderness on each side of the stump.

In July 1823, she went to the sea-side, and here first complained of her spine; she discontinued bathing, and appeared in better health. About the end of November, she complained very much of pain in her back and tingling in her arms, with a difficulty of supporting herself erect. On examining the spine, percussion produced more uneasiness in every part than is usually manifested, and much pain about the lower dorsal vertebræ.

April 2d, 1824. She has at various times suffered much from

spasms about the chest; her appetite has been generally bad; she has been obliged to take an opiate every night, for when she omitted it for a few nights, the spasms were more frequent. She occasionally complains of pain in her back, and especially if her hand be raised. She was seized with a violent pain in the left knee, which continued for two or three days. On making an examination of the spine, pressure on each side of the spinous processes of several of the vertebræ produced pain, and percussion with a key made it very severe. She has had difficulty in voiding her urine. A blister was applied to the spine, after which the spasms about the chest were less severe, and her health has improved. Her father had a paralytic stroke; this made her very uneasy, and brought on an attack of tic douloureux in the face. During the summer her state was various. Sometimes she had considerable pain in her back and chest, and then her digestive organs were generally disordered. She does not now complain of her hand, but has numbness and want of feeling in the left hip and shoulder; she has pain at the back of her neck, and feels as if the neck could not support the head. In November she hurt her hand just where the finger was amputated, and she has complained of pain ever since, and feels the amputated finger very sore; this sensation, however, soon subsided. At the latter end of the year 1825 and the beginning of 1826, she was affected by dizziness, in fits of which she fell down, but never entirely lost her consciousness. She went to the seaside in August, 1825, and returned home about the end of September very much improved in health. The left arm and leg are weaker than the right. In 1829, Mr. Swan left Lincoln, where the patient resided. She subsequently suffered from pains in the hand and the amputated finger, to which other complaints were superadded. The tic douloureux also returned. She often suffered from sneezing, strangury, and pain under the nails of the fingers and toes. Throughout her illness the left side was most affected. In 1833 she still continued in the same condition."

One of the most ordinary causes of neuralgia induced by injury to the nerve is venesection, especially when the fleam[1]

[1] [It may be well to observe, that the "schnepper" or fleam, is an instrument not unfrequently used in Germany for venesection; it is a single lancet enclosed in a

is employed, and the arm is not nursed after the operation. We do not frequently meet with cases in which the irritation of the nerve fibres is caused by foreign bodies lying in the course of the nerve. Denmark[1] has observed and described a case of this kind, of which the following are the main points:

"Henry Croft, a healthy young man, belonging to the 52d regiment, was wounded at the storming of Badajos. A musket-ball entered the triceps extensor cubiti about one inch and a half above the inner condyle of the os humeri, grazing the inside of that bone, and passed obliquely downwards through the brachialis internus, and out anteriorly near the bend of the arm. The wound soon healed, and without manifesting any particular morbid symptom during the cure. On his admission into Haslar Hospital, I found him labouring under excessive pain, which the largest opiates could not assuage, with almost constant watching. The little sleep he had, if it could be called such, was disturbed by frightful dreams and starting. I always found him with the forearm bent, and in the supine posture supported by the firm grasp of the other hand. The wrist also was bent, being unable to move it into any other position by the voluntary exertion of its own muscles. He could suffer me to extend the hand, but with increased pain. It always, however, on the removal of the extending power, fell into its former bent situation. The act of pronation he could also suffer me to perform, but, in like manner, with increase of pain. A small tumour could be felt in the site of the wound on the anterior part of the arm, which he could not bear to be touched without evincing additional torture. He described the sensation of pain as beginning at the extremities of the thumb, and all the fingers except the little one, and extending up the arm to the part wounded. It was of a burning nature, he said, and so violent as to cause a continual perspiration from his face. He had an excoriation in the palm of the hand, from which exuded an ichorous discharge. The cause of this he ascribed to a shell rolling

metallic box, and acting by a spring, upon the same principle as the cupping instrument. At all times a dangerous instrument, it becomes still more so in unexperienced hands, from the very fact of its supposed security.—Ed.]

[1] An example of Symptoms resembling Tic Douloureux produced by a Wound in the Radial Nerve. (Medico-Chirurg. Transact., vol. iv, p. 48.)

over it. His agonies, he observed, were insufferable, depriving him of sleep and the enjoyment of his food, for which he had some time an appetite. He declared himself incapable of enduring it any longer without some relief, and earnestly requested the removal of the arm. Before proceeding to any operation, I recommended him to try the effects of the warm vapour baths, but from none of these he experienced any alleviation of his sufferings. The symptoms were sufficiently clear, I conceived, to lead to a correct diagnosis. The part wounded, the nature of the pain, and its course from the fingers, with the exception of the little one, indicated the affection to be in the radial nerve. The increased pain attendant on the act of pronation further corroborated that supposition, from the pressure of the pronator teres upon the nerve in its passage through that muscle. In a consultation which I held with my colleagues on the case, when we considered the chances of failure, together with the injured state of the arm, and contracted elbow-joint, we determined on the propriety of amputation. I immediately performed the operation, and with instantaneous relief to the patient. He was discharged cured in three weeks, having in that time rapidly recovered both his health and strength. On dissecting the arm I traced the radial nerve through the wounded parts. It seemed to be blended with and intimately attached to them for the space of an inch. It had been wounded, and at the place of the injury was thickened to twice its natural diameter, and seemed as if contracted in its length. On further examination I was surprised to find, on dividing the fibres on the posterior part of the wounded nerve, that there was a small portion of the ball firmly imbedded in it, which had been driven off by grazing the bone."

Tumours developed within the nerves, the so-called painful tubercles, act in the same way as foreign bodies. They are rarely tubercular, but generally of a fibrous or fibro-cartilaginous character; of a round shape and small dimensions, between the size of a millet-seed, a pea, or, at the most, of a bean; they lie in the cellular tissue, between the fasciculi of nervous fibres, especially of the cutaneous nerves, and most frequently in the extremities. They are generally solitary; it is unusual to meet with several in the same individual. They

are stationary in point of size, and though they may exist for a series of years, they do not increase. When superficial they cause a slight elevation of the skin, the colour and texture of which is unaltered; they are moveable, and are perceptible to the touch by merely applying the finger to the part.

The pathognomonic symptom consists in violent pain coming on in paroxysms, excited by external causes, such as compression or blows, or by affections of the mind and atmospheric changes: the causes are sometimes not to be traced. The most violent pain manifests itself in the tubercle itself; it shoots like an electric shock along the peripheral distribution; it rarely takes a centripetal direction, and is at times accompanied by sympathetic affections of other cutaneous nerves. During the paroxysm, the skin is so excessively tender, that the most superficial and gentlest contact increases the pain, which is not the case in the intervals. The paroxysms last from ten minutes to several hours. The frequency and intensity of the attacks appear to increase in the ratio of the duration of the disease. Many patients enjoy interruptions of days and weeks, others again have repeated attacks in the course of four and twenty hours. In some the seizures occur at night, attended with great terror.

We know little or nothing of the causes of the complaint. Sometimes it has followed a blow or a puncture. The female sex has an undoubted tendency to the affection. Out of 18 cases Wood[1] has observed it 14 times in women; and of the 13 cases quoted by Descot,[2] 10 occurred in females and 3 in males. The three cases which I have met with also affected women.

There is another variety of tumours, whose habitat is in the peripheral nerves; it is called *neuroma*, and consists of fungous and scirrhous tissue, in whose interior not unfrequently cavities and cysts are found, containing a variety of fluids. The fibres of the nerve are generally spread over these tumours like a fan. (We shall speak of the microscopic appearance of a tumour of this kind under the head of cutaneous anæsthesia.) They attain a considerable magnitude, increasing to the size of a hen's egg and more; they are generally moveable from side to

[1] Wood on painful Subcutaneous Tubercle, in Edinb. Med. and Surg. Journal, vol. viii, pp. 283 and 429.

[2] Descot, Dissert. sur les Affections Locales des Nerfs; Paris, 1825, p. 208.

side, but cannot be moved longitudinally without exciting severe pain. The cutaneous coverings present a normal appearance. Their growth is generally rapid, and in the course of their existence they present an alternation of increase and decrease. The cause of the affection has never been ascertained; the tumours have not been met with before the age of puberty; they are more frequent among the male than the female sex; the symptoms do not differ from those of the painful tubercle.

When a cutaneous nerve has been wounded, the treatment should, from the commencement, be considerate and careful, though the wound may apparently be of a trifling character. Foreign bodies should be removed, healing by first intention promoted, and perfect rest of the affected part enjoined. We must then seek to limit the extent of the inflammatory process by leeches and cold lotions; while gastric derangement, which easily supervenes, has to be combated by repeated purgation. The paroxysms may, however, attain such intensity, that these measures do not suffice, and the division of the nerve is rendered necessary. A case is related by Swan,[1] of a girl who had been bled, and a few days after was seized with violent convulsions, followed by sopor: at the time of the venesection she had complained of much pain in the arm, which extended up to the shoulder. The wound had not cicatrised, and was rather inflamed; the examination at once excited a convulsive attack, which was removed by the application of a tourniquet above the seat of injury. The convulsions soon after returned. Injury of a cutaneous nerve was assumed to have taken place, and an incision above the wound of one inch in length and some depth was made. As the symptoms continued, a deeper and longer incision was soon after repeated above the first, with such effect that the patient immediately recovered herself, and the pains and convulsions ceased. Medical advice is not, however, always taken directly after the occurrence, but after a considerable time has elapsed, when the wound has cicatrised, and the patient has been reduced by sufferings. In this case the cicatrix should be first examined, and narcotic inunctions tried, *e. g.* Extr. Belladonnæ, ʒj; or Pulv. Opii, ϑj, to Adipis, ʒj.

[1] A Treatise on Injuries and Diseases of the Nerves; London, 1834, p. 117.

Counter-irritants may be tried, such as Pearson's[1] favorite remedy: R. Olei Olivæ, ℥iiss; Ol. Terebinth., ℥iss; Acid. Sulph., ʒj. M.; and this should be continued until the appearance of an erythematous rash. The value of these remedies is not very marked, and surgical interference becomes necessary. We are left the choice between *excision* of a portion of the nerve above the seat of injury and *amputation*. The latter is the safer proceeding; and in the case of small members, such as fingers or toes, it should be preferred.[2] When the larger extremities are affected, excision should be attempted, unless urgent reasons, such as a high degree of constitutional irritation, render amputation preferable. Benefit has been occasionally obtained by mercurial salivation.[3] When tumours exist in the nerves, and especially if they are superficial, excision is absolutely necessary.

If a constitutional affection remains, and the sympathetic sensations are very intense, steel medicines, with salt and sea-baths, are advisable; at the same time, it is necessary to watch the spinal cord in case of its becoming involved.

Before passing to the description of the varieties of neuralgia, I must advert to a few points, and especially to a phenomenon for which we are as yet unable to offer a physiological explanation. I allude to the occurrence of pain, not only at the peripheral terminations, according to the law of eccentricity, but also at certain points of the nerve, such as the vicinity of its exit from a bone, or its passage through fibrous membranes, and where it lies close to the skin. Thus, by striking or pressing upon the ulnar nerve at the elbow, a sense of numbness is produced at the point of injury, and in the fourth and fifth fingers; in the same way, pain is not only frequently manifested in the seat of the painful tubercle, but also in the peripheral terminations of the irritated nerves. This sensation occurs spontaneously, or from some external cause; Valleix

[1] Medico-Chirurg. Transact., vol. viii, p. 266.

[2] See Wardrop's account of a case, where a severe nervous affection came on after a punctured wound of the finger, and in which amputation was successfully performed. (Ib., vol. viii, p. 249; vol. xii, p. 240.)

[3] See Hamilton's valuable Paper on certain consequences of Injuries to the Nerves, in Froriep's Neue Notizen aus dem Gebiete der Natur und Heilkunde; 1838, vol. vii, No. 18, p. 282.

looks upon this as pathognomonic of the painful tubercle. It is said that there are one or more circumscribed points in the course of the neuralgic nerve, which are very tender when pressed by the point of the finger, either in or out of the paroxysms.[1] In cases of neuralgia of the fifth pair, such painful spots are to be met with at the supra-orbital, infra-orbital, and mental foramina, in the lip, the nose, and the temples. I have never been able to confirm this statement as regards the periods of intermission, though I have instituted repeated examinations as to the point. During the paroxysms I have often seen the patients apply their fingers firmly to the points at which the fifth pair issued, in order to obtain relief by increased pressure. This is confirmed by Bell's observations; thus he gives a case in which the pain came on suddenly, and in paroxysms of great intensity, like electric shocks. The patient at once applied one finger to the infra-orbital foramen, another to the inner canthus of the eye, and a third to the frontal nerve, and remained immovable in this position.

The opinion has been maintained that the pain of neuralgia is confined to the course of a nerve, so as to follow its trunk and ramifications. Close observation shows that the pain only occurs at certain points of one or more nervous tracts, either concurrently or successively, but in the latter case with such rapidity as to cause a semblance of continuity. New and unsophisticated patients afford more trustworthy evidence on these matters, than parties who have been subjected to medical questionings for years past.

The state of sensibility during the intermissions of the neuralgic attacks, deserves special attention. It is only at the commencement of the disease that it remains normal; as the disease continues, the patients complain of a dull aching and a sense of numbness in the affected part, without a diminution in the sensitiveness of the part being perceptible on external manipulation.

[1] Valleix traité des Neuralgies; Paris, 1842, pp. 666—672.

CHAPTER IV.

NEURALGIA OF THE FIFTH PAIR.

SYNON.—*Dolor Faciei Fothergillii.—Prosopalgia.—Tic Douloureux.—Facial Neuralgia.*

Experimental Results.—Irritation of the sensitive branches and fibres of the fifth pair and its ganglion excites violent pain in the living animal, more so apparently than the irritation of other sensitive cutaneous nerves. Division of the fifth pair within the cranium, as effected by Magendie[1] and others, is accompanied by a loud scream indicative of pain.

In all its distributions and connections, the fifth pair communicates sensibility even to motor nerves. Through its agency the facial nerve becomes sensitive. Recent experiments have proved beyond a doubt, that the sensibility of the facial nerve is not inherent in it, but borrowed; for irritants applied to the facial nerve within the cranium, before its entrance into the auditory foramen, give rise to twitchings only, and not to pain.[2] If the trunk is divided after its exit from the stylo-mastoid foramen, the facial branches exhibit traces of sensibility, because the connection with the fifth pair is undisturbed.[3] When the trigeminus has been divided, whether in or out of the cranium, the facial nerve shows no trace of sensibility, in the former case throughout its distribution, in the latter in its separate branches.

Surgery affords such numerous proofs of the fifth pair being a nerve of sensation, that it is almost superfluous to quote any instances. During the year 1837 I was present during the removal of a steatomatous tumour, which my deceased friend Professor Dieffenbach performed with his acknowledged mastery. The patient behaved with heroic patience until the moment when, in sawing through the bone, the infra-orbital nerve was

[1] Leçons sur les Fonctions et les Maladies du Système Nerveux, t. ii, p. 21.

[2] Valentin, de functionibus nervorum cerebralium et nervi sympathici, p. 32, § 70.

[3] Magendie, loc. cit., p. 198.

torn; she then screamed out, and leaped from her chair in agony.

Sketch of the disease.—There are generally no premonitory symptoms, but occasionally a sense of tension, itching, or creeping precedes; the pain comes on in paroxysms at some point of the face or its cavities; it is confined to one side, and the stabbing, bearing, or crushing pains are of the most agonising character. They rarely remain limited to one spot; they generally dart with the rapidity of lightning forwards and backwards, to near or more remote points, and with rare exceptions maintain the same course in every paroxysm. The paroxysm is made up of small attacks, and recurs at irregular intervals. The more frequent its renewal, the longer the disease lasts, the more sensitive the affected side of the face becomes to gentle, unexpected, or superficial contact, which generally gives rise to an immediate and violent accession of pain. Mere touching or stroking the part, or passing the razor over it, may suffice to induce it, whilst the application of strong pressure generally fails to do so, and even affords relief. Trifling movements of the facial muscles, in speaking, chewing, or blowing the nose, excite the pain. During its continuance the muscles of one or both halves of the face twitch or continue in an immovable fixed position. The complexion is frequently altered, the painful part looks flushed and shines as if it were oiled. The arteries pulsate, the veins are tumefied; the temperature of the suffering portion is exalted, whilst the hands and feet are chilled. At times the whole body trembles, and the sensitiveness is generally increased.

The attacks and characters of the pain vary in different individuals as well as in the same patient. The physician has a greater difficulty in rendering a faithful picture of the disease than the educated patient experiences, when, after suffering for a long period, he has acquired sufficient self-control to observe himself. A delineation of this kind is to be met with in Barth's excellent treatise.[1] The description by Valleix[2] of neuralgic pains is less faithful, independent of its manifesting an utter ignorance of the laws of isolated conduction and

[1] Mehrjährige sorgfältig angestellte Beobachtungen über den Gesichtsschmerz, nebst einem Vorworte, von Prof. Dzondi; Leipsic, 1825.

[2] Traité des Neuralgies; Paris, 1841, pp. 34, 50, 99, &c.

eccentric phenomena, as well as a want of sound physiological reasoning.

The direction of the pain varies according as the neuralgic affection occupies different branches of the fifth pair. The region of the second branch, the superior maxillary, is most commonly attacked. The pain makes its appearance at the alæ nasi, the upper lip, or in the upper row of teeth, or it penetrates the gums and the posterior nares. The ophthalmic branch, and especially its frontal offset, is the next in order of frequency. The pain darts upwards to the forehead or the eye-brows, at times it shoots to the angle of the eye, or the caruncula lacrymalis, or it rages in the globe. Tears are a common symptom or sequel of this affection. The third branch is more rarely the seat of neuralgia; when it does occur here the pain is spread over the lower teeth, the chin, the nether lip, and the edge and point of the tongue, and is generally accompanied by a flow of saliva. A single branch may be affected, or several simultaneously, or they may be attacked alternately.

Some authors have assumed the facial nerve also to be a seat of neuralgia, nor can it be denied that the pain at times darts along the course of this nerve. The physiological explanation offered is, that the facial nerve is not exclusively one of motion, but originally a compound of motor and sensitive fibres, the portio intermedia Wrisbergii being looked upon as the sensitive constituent.[1] The experiments quoted above prove the inadmissibility of this assumption, and pathological observation is equally opposed to it. I have had repeated opportunities of convincing myself that the sensibility of the parts is in no wise altered when the facial nerve is paralysed by injuries in the vicinity of the stylomastoid foramen, or by a tumour pressing upon the trunk of the nerve. Magendie[2] has noticed that during the treatment of paralysis of the facial

[1] [The facial nerve arises by two divisions: the larger takes its origin between the restiform and olivary bodies; the lesser lies external to the former, and between it and the acoustic nerve; it arises by several filaments which unite to form a small nerve,—this is called the portio intermedia Wrisbergii.—Ed.]

See the excellent Dissertation of Gädechens, 'Nervi facialis Physiologia et Pathologia;' Heidelberg, 1832, p. 18.—Arnold, Untersuchungen im Gebiete der Anatomie und Physiologie, vol. i, p. 210; Zürich, 1838.

[2] Leçons, &c., vol. ii, p. 209.

nerve by galvanism, pain was excited not only by insertion of the platinum needles into the skin, but also that when the branches of the facial nerve were pricked, pains of a peculiar character were felt, extending in all directions, to which the pricked branch sent filaments, and which were dependent upon the fibres of the fifth pair accompanying the former.

Course and duration.—Facial neuralgia takes a periodic course with a regular or an irregular type. In the former case the supraorbital nerve is most commonly affected, and the type has the quotidian character; the tertian is rare; the quartan never occurs, and the disease itself is of short duration. One of my patients had for eight years an annual autumnal attack of frontal neuralgia, with a quotidian type. With the exception of some shivering, which preceded or accompanied the attack in some cases, I have not observed heat, perspiration, or urinary sediments during or after the attack. When the affection presents no regular type, it continues for years; it may last half the life and longer, making occasional intermissions of six months and more. Neuralgia also intermits during the occurrence of other intercurrent diseases.

Termination.—Halford[1] states that apoplexy is the ordinary termination of this disease. Psychical affections, depression of spirits, a morbid taste for seclusion, and tædium vitæ generally follow in its train. One of my patients, an old woman æt. 72, who had suffered from tic douloureux for thirty years, drowned herself after repeated futile attempts at suicide.

Post-mortem appearances.—We possess but few and incomplete records of the post-mortem appearances of facial neuralgia, and they have been supplied by English medical men. Sir H. Halford, in his essay on Tic Douloureux, refers to several cases in which he has met with hypertrophy and other morbid conditions of the cranial and facial bones; such as thickening of the frontal, ethmoid, and sphenoid bones, to the extent of half an inch, exfoliations of the alveolar processes of the teeth, exfoliations of a piece of bone from the antrum highmori, and exostosis of a tooth. Two other inquiries have since confirmed Sir Henry Halford's observations. In the museum of Guy's Hospital, in London, there is the cranium of a neuralgic

[1] Essays and Orations read and delivered at the Royal College of Physicians; London, 1831, pp. 37—51.

patient[1], upon the internal surface of which a very considerable osseous deposit is found. Travers[2] describes the post-mortem appearances met with in the well-known London physician, Dr. Pemberton, who had suffered from neuralgia of the left infraorbital nerve. The frontal bone was unusually thick, having a diameter of $\frac{2}{3}$ths of an inch above the frontal sinuses, and of more than $\frac{2}{3}$ths at its junction with the parietal bones. In the falx cerebri, not far from the crista galli, there was an osseous concretion. There was congestion at the surface, and within the white matter of the right hemisphere, while the right showed no trace of it. The right lateral sinus was also full of blood in the vicinity of its communication with the jugular vein. The ventricles contained seven and a half drachms of serous fluid. Finally, we are favoured with the following account by Dr. Bright.[3] "Mary Grossmith, aged 40, from Westerham, was admitted, under my care, into Guy's Hospital, in August 1827. She was thin, and her countenance was strongly marked by the effects of long suffering. Her most prominent symptom was extremely acute pain on the left side of her face, which was seldom completely removed, but became more severe in paroxysms. It was regarded as tic douloureux by all who had seen her, and resisted all the means employed for her relief. Within about a fortnight of her death, three molar teeth on the affected side were drawn at different times: after each operation the pain for a time was rendered less severe, but an offensive discharge proceeded from the wounded gums; and for a few days before her death, a discharge of the same kind took place from the nose also.

"*Sectio cadaveris.*—The membranes about the upper part of the brain offered nothing remarkable, but the quantity of serum, both external to the brain and in the ventricles, was more considerable than is natural. The fifth ventricle was rendered very conspicuous. The brain was softer than in perfect health, and the medullary matter slightly mottled with a light purple

[1] Catalogue, No. 1074.

[2] A further Inquiry concerning Constitutional Irritation and the Pathology of the Nervous System; London, 1835, p. 351.

[3] Reports of Medical Cases, selected with a view of illustrating the Symptoms and Cure of Diseases by a reference to Morbid Anatomy, vol. ii, part ii; London, 1831, p. 506.

cloud. The dura mater, immediately under the anterior part of the left middle lobe, was considerably but irregularly elevated by fungoid tumours, equal collectively to about the size of a pigeon's egg. There was a corresponding depression in the substance of the brain, which at this spot was slightly adherent and disorganised, but not completely softened, nor was the raised portion of the dura mater ulcerated or materially altered. The bone beneath the tumour was diseased, and in some parts offered no resistance to puncture. The morbid growth appeared to have extended from the sphenoidal sinuses. The mucous membrane, having all the nasal cavities on that side, were similarly affected, but to a less degree. There was a soft pedunculated polypus, of about the size and shape of a raisin, attached between the turbinated bones. The branches of the portia dura, so far as they were laid bare in the removal of the diseased parts, exhibited no morbid appearance."

As the information afforded by pathological anatomy on the cause and seat of facial neuralgia was so very limited, I was much gratified by having the opportunity of examining a case of the kind myself. It was one of a man who had for twenty-six years been a martyr to facial neuralgia, and who had been under the joint treatment of myself and the late Dr. Formey thirty years previously. During the last ten years of his life, my esteemed friend, Professor Barez, and Dr. Philipp were his physicians; to the latter I am indebted for the following history. The post-mortem examination was made by the experienced hand of Professor Froriep, who was also kind enough to make the artistic and instructive drawing accompanying my academical treatise.[1] Mr. F—, one of the best informed and most respected merchants of Berlin, was born of healthy and robust parents. His mother died at sixty-four, and his father attained the age of eighty-four; the latter suffered much from gout. An elder brother, who still survives, states that the subject of the present account was a fine healthy child, who received his first nourishment from a healthy wet-nurse. As a boy he got over several serious diseases of childhood successfully. He stammered early, and had a particular difficulty in pronouncing L and N. This defect accompanied him to the grave. At the age of twenty-eight, the patient entered into a

[1] Neuralgiæ Nervi quinti specimen; Berolini, 1840.

matrimonial alliance, which was not, however, of long duration. Towards his fortieth year, a chronic and very irritating eruption occurred on the inner side of the thighs, the perineum, and scrotum, which gradually disappeared. Immediately after it had done so, the neuralgia made its debût. It seems advisable, in the description of the disease, to commence with what I gleaned by my own observation, and occasionally to introduce the fragmentary communications of the patient, who showed a strong disinclination to speak of his sufferings.

Mr. F— was in the fifty-seventh year of his age, and in the eighteenth of his sufferings, when I first saw him. He was of middle stature, and tolerably fat, his abdomen projected; the vicinity of the nipples was well padded, and the extremities, though not muscular, were plump and voluminous. His gait was that of an old man, with a curved back, the head bent forward, and tottering steps. All his movements exhibited the greatest clumsiness; the patient was unable to put on a single article of dress without assistance. His face presented so strange a conformation, and made so unpleasant an impression upon all who were unaccustomed to it, that children could scarcely be induced to kiss him. The cranium was largely developed, but the face appeared excessive in proportion to it. Both cheeks presented a dark red complexion, which became more or less livid in proportion to the violence of the paroxysms; the left showed it more intensely than the right. Both cheeks were affected with acne, which disappeared and reappeared periodically, though not in any ratio with the paroxysms and intermissions of the neuralgia. The prominent and fleshy nose exhibited the same discoloration as the cheeks. The lips were never entirely closed, as the nether one was much tumefied and drawn over to one side. This distortion increased when the patient laughed or stammered, and gave the face the appearance of a comical mask. The front teeth of the lower jaw alone remained—those of the upper jaw had all been removed during the first years of the malady, because the cause was supposed to reside in them. Extreme short-sightedness and very large eyes further characterised this peculiar physiognomy.

The left side of the face was the seat of the neuralgia, and though I often put the question, whether any painful sensation occurred on the right side, the patient invariably denied it;

besides I have had repeated opportunities of convincing myself that the left eye was chiefly reddened after the attacks, that the left cheek assumed a livid hue, and that he used his pocket-handkerchief chiefly to cover and compress the left half of the face. During the intervals I was occasionally permitted to test the sensibility of the two sides with a needle. The result was invariably the same, viz. exalted sensibility of the left side of the face in the entire range of the fifth pair. There was no difference of sensibility on the two sides of the tongue; both sides tasted alike and normally. I never heard the patient complain of pain in the hard and soft palate. Shaving repeatedly induced an attack; the upper lip close to the septum nasi was peculiarly susceptible to the touch of the razor.

When the patient was asked, after a paroxysm, to designate the place where the pain had raged, he either pointed to the left eye and the parts adjoining outside and above, or he passed his finger from the inner canthus of the eye down the nose, or he pointed to the lips, the tongue, the cheek, and the temples. He frequently placed my hand on one of these regions, that I might feel the pulsation of the arteries; the pulsations were particularly violent when the temple had been the seat of the attack. During the paroxysms, and often long after, convulsive movements were perceived on the lower eyelid, the cheek, and upper lip; the patient's aspect was frightful when the tongue was thrown about, or as he expressed himself was being ground. We have already observed, that the veins were much developed in the parts most affected, the cheek and the nose.

When the ophthalmic branch was attacked, the eye was bloodshot during the paroxysms and for some time after, as in an advanced degree of traumatic ophthalmia; it projected from the orbits as if this had become too contracted for it. At the same time there was tumefaction of the eyelids, and a copious discharge of tears and mucus from the nose. Salivation ensued, when other branches were affected, and formed one of the most troublesome symptoms, as it was associated with a foul tongue, loss of appetite, and almost unquenchable thirst—besides it often continued during the intervals for weeks and months, every letter written by the patient, his clothes and his linen, showing traces of this affection.

The paroxysms seized the patient without the slightest premonitory symptoms with the velocity of lightning; he might be talking, and they cut the word he was uttering, or they attacked him, and this was more frequently the case, while he was eating or drinking, or coughing, sneezing, or driving over the pavement, while shaving, or if in any way excited; but as often there was no exciting cause to which the attacks could be referred, and the patient might be perfectly at rest. They lasted one minute at the most; they differed much in intensity; it was most violent and insupportable when seated in the interior of the nose, the patient then felt as if his face was being burst asunder. In the milder attacks he was able to continue in the position that he happened to occupy when they came on; he pressed a pocket-handkerchief against his face, and only occasionally emitted a groan of suffering. When more violent they forced him from his seat and drove him through suites of rooms; they compelled him to utter screams that more resembled a roar, and not only alarmed the inhabitants of the same house, but even reached the neighbours. During the latter years the paroxysms scarcely attained this extreme pitch. The exhaustion following them varied in intensity, but always was more in the ratio of the general state of health than of the intensity of the attacks.

It was impossible to trace any uniformity or type in the affection during the time that I was acquainted with Mr. F—. He was not secure against the cruel attacks at any time of the day or night, nor at any season. The patient had good and bad periods; he scarcely ever was free from the fits for a week, scarcely even a day, but in the bad times the attacks succeeded each other so rapidly that one could scarcely speak of intervals. Long-continued hot weather perhaps excepted, no atmospheric conditions appeared to exert any influence upon the disease.

The general health of the patient was, on the whole, good; it seemed as if the dreadful malady with which he struggled, protected him against many other complaints. Considering the rigid diet to which he was subjected during the last ten years, his strength was satisfactory. He was able to stand for hours at his desk engaged in writing and calculating, or to walk for hours in his garden.

It was not till the last year of his life that there was a visible diminution of the powers, and that an evident affection of the central organs became manifest. Two symptoms indicated this more particularly; one was the inability to retain his urine for any length of time,—the other vertigo, which attacked him from time to time while walking; it caused him to be in great dread of falling on his left side, although he was conscious of the firm resolve to maintain his balance at all hazards. This giddiness was always accompanied by a great and enduring feeling of weakness in the lower extremities.

The mental faculties remained untouched throughout the disease. I should wish to point out, as a remarkable physiological fact, that although forced by his affection to avoid all society, and to retire within himself, the patient showed no lack of the milk of human kindness, and continued to take a lively interest in everything that generally occupies the attention of men of education and position.

Many doctors were put on the *qui vive* by the unhappy condition of the subject of these remarks. Volumes of prescriptions showed the zeal with which the Pharmacopœia had been ransacked to discover a weapon of sufficient strength to overcome the all-powerful enemy. I shall confine myself to the following short summary of these attempts.

1. The whole host of narcotics was called into aid during the first few years, not only fruitlessly but to the actual augmentation of the disease. This especially refers to hydrocyanic acid, belladonna, and opium.

2. A few remedies which at first proved very serviceable were useless after continued exhibition, this was the case with the sesquioxide of iron and assafœtida.

3. The best results, if we may say as much, were obtained by the negative treatment and avoidance of violent interference, suggested by Dr. Barez. The main point attended to was a limitation to vegetable diet, avoidance of everything of a heating or stimulating nature; to this was added an occasional purge, leeches, cupping, and even venesection.

Death was induced by retention of urine, which does not appear to have borne any relation to the main disease. It is remarkable that from the first appearance of ischuria, ten days previous to the fatal termination, the neuralgia vanished entirely.

During the last four days of life sopor and convulsions supervened.

Post-mortem report.—The examination was made thirty-six hours after death, and was conducted by Professor Froriep in the presence of Dr. Philipp and myself.

The cranial bones were hypertrophied, being from four to five lines in thickness; the external lamella was unaltered; the diploe had disappeared; and the internal lamella had a diameter of about four lines, was somewhat porous, but on the whole firm and dense in texture. The inner surface of the calvarium was very uneven; the meningeal arteries running in deep grooves, towards which the bone was bevelled off so as to offer the greatest thickness in the middle between two arteries. The dura mater was so firmly attached to the bones, that it had to be removed with them. The inner surface of the dura mater showed several insulated red spots, and presented others that were larger and more numerous, especially over the left hemisphere of the cerebrum, which were covered with a gelatinous yellowish-red exudation of from half a line to one line in thickness; here and there new-formed vessels were seen, and it consisted of loose cellular tissue infiltrated with a serous fluid. On removing the calvarium and the dura mater, the cerebrum appeared atrophied. Instead of two uniformly arched hemispheres, we met with two irregularly-shaped surfaces, marked with and compressed by sulci and indentations. The arachnoid was thickened in parts, and underneath it there was a serous exudation, which from being infiltrated into the pia mater offered a gelatinous appearance. The gyri were narrower and thinner than they are in the healthy brain.

The brain, on being removed from the skull, presented reddening of the inner surface of the dura mater, with a reddish plastic exudation at the base, and especially on the sella turcica.

At the base of the brain a distension of the third ventricle by a watery fluid was visible; the arachnoid was opaque, and the arteries were morbidly changed. The right vertebral artery was atrophied; it was of the thickness of a crow's quill, while the one on the left side was thickened here and there, and of a larger calibre than usual. The basilar artery also

presented several dilatations, at which the coats were thickened, and contained yellow cartilaginous points; the left internal carotid was dilated at its point of division, and its posterior half of treble the ordinary thickness from conversion of the fibrous membrane into cartilage.

The pons Varolii was more flaccid and softer than normal; especially as compared with other parts. Its right side was atrophied; an impression as if made with the finger ran along it from before backwards; the left half did not present the normal elevations, but there was no depression. The pia mater investing the pons was very vascular.

The trigeminus of the left side was only half the ordinary thickness, — slightly reddened, presenting one spot of a dark red; no filamentous structure was to be found in it, the nerve being almost reduced to a pulp. The smaller division of the nerve, which was also softened and attenuated, was only to be distinguished at the inner side of the nerve, at a distance of six lines from the pons. The trigeminus of the right side was thinner and softer than usual, and somewhat reddened; but the filaments and the smaller division were distinguishable in it from the commencement. The portions of the fifth pair left in the cranium, from the point of division to the point at which they entered into the fissure of the dura mater, also presented an unusual diminution of bulk and a slightly reddish-yellow tinge of the nerves; their filamentous structure became more apparent the nearer they were examined to their termination.

An horizontal incision was now carried through the crura ad cerebellum and the pons, immediately beneath the insertion of the fifth pair, so as to trace the fibres of the fifth pair as well as can be done in a recent brain in these central parts. In the first place, this section showed the grey matter of the pons diminished, while it was normal on the right, though externally more reddened by numerous distinct blood-vessels. The sectional surface of the left crus ad cerebellum presented a great number of delicate red spots of blood, which caused the white tract of the trigeminus to be the more apparent. At its external side, about a line and a half from the so-called origin of the left trigeminus, the medullary matter of the crus was rather reddened and softened, and contained an irregularly quadrilateral, hard corpuscle of the size of half a lentil, yellow,

of a greyish translucency in the middle, and exhibiting increased density and hardness on examination with the scalpel. The right crus is normal, and the filamentous structure at the origin of the right trigeminus is more distinct than on the left side.

Both Casserian ganglia and their three branches, the first two of which were examined as far as the orbit on both sides, presented no abnormal appearance, except that the ganglia were rather paler than usual. No irregularity was perceived in the oculomotor and trochlear nerves. The abducens was traced in the cavernous sinus on both sides, and found to be normal. This, however, led to an important discovery. On opening the cavernous sinuses from above, the right carotid appeared normal, if we except a few points of cartilaginous deposit; but the left internal carotid was distended to double its ordinary calibre, so as to form an aneurism both in its anterior and posterior arch. The walls of these aneurisms were cartilaginous and much thickened: by their pressure the fossa that receives the carotid in the sphenoid bone, which ordinarily is shallow and merely traced out, (passing from the foramen caroticum to the side of the sella turcica,) was converted into a deep S shaped fossa. There was no trace of inflammatory action in the bone, but the left posterior clinoid process and the left side of the body of the sphenoid bone had disappeared by mere absorption. The left half of the pituitary gland was converted into a purplish-brown pultaceous liquid, such as also filled the entire left cavernous sinus, and surrounded the aneurism. As the ganglion Casseri lay between the plates of the dura mater, at the external side of the aneurism, it was necessarily exposed to pressure from it,—the more so as the base of the brain showed no change of position in the external wall of the left cavernous sinus,—and therefore the Casserian ganglion was bound down to the side of the body of the sphenoid bone by the tense dura mater. All the ventricles of the brain, including the fifth, contained a considerable amount of a reddish serous fluid.

Besides the brain, the urinary bladder was also examined with reference to the dysuria and retention of urine, from which the patient had suffered. It was found enlarged, the muscular fibres thickened, and the mucous membrane covered

with considerable ecchymoses, as generally seen after ischuria. A large diverticulum presented itself on each side, projecting outwards through the muscular fibres of the bladder. Enlargement of the lateral lobes of the prostate, and of the so-called third lobe of the prostate, caused an almost entire occlusion of the neck of the bladder.

Where there are so many morbid changes in a single organ, it is necessary to seize the relations which bind the different links together. Thus we may, as it were, resuscitate the inanimate corpse, and convert what would otherwise be a mere epitaph into a living representation of the disease. In the present instance the general affection of the blood-vessels must probably be looked upon as the foundation and cause of the other changes that took place in the brain. Cartilaginous formations and incrustations of the cerebral arteries are not unusual after the fiftieth year; still a condition of this kind, universally affecting the arteries of the brain, is uncommon. The aneurism of the left carotid, the dilatation of the left and the atrophy of the right vertebral, are evidences of the further influence of such change upon the vessels. The influence exerted upon the nutrition of the brain appears equally important, and is most marked in the atrophy of the right half of the pons Varolii, which corresponds to the atrophy of the vertebral artery of the same side. The hemispheres of the cerebrum were also atrophied; they not only appeared compressed when the dura mater was removed, but the gyri individually were narrower and thinner than in the normal state. In order to fill up the space left by the atrophy of the cerebral tissue, we see the ordinary succedanea, exudation, between the membranes, and thickening and hypertrophy of the cranial bones.

This is the soil upon which the evil has grown, that gave rise to the long tortures of pain. The fifth nerve of the suffering side was affected in different ways at two points. In the first place, it was softened and had lost its filamentous structure at the point where it leaves the pons Varolii; the softening of its fasciculi was perceptible, even within the brain, in its passage through the pons and through the crura ad cerebellum, and an indurated node was found within them. In the second place, the Casserian ganglion, though normal in

structure, was subjected to tension and dragging by the aneurysmatic swelling of the carotid and its pulsations. We may conclude, from the duration and slow progress of the disease, and the absence of anæsthesia, which commonly accompanies disorganisation of the fifth pair, that the irritation of the Casserian ganglion by the carotid aneurism had the precedence, in point of time, over the other morbid conditions; we do not, however, deny that the foreign yellowish body imbedded in the filaments of the fifth pair may have been a source of irritation, in the same manner as the painful tubercle acts in peripheral nerves. At all events, the coincidence of the two conditions more than suffices to explain the neuralgia and its not being amenable to treatment.

The physiological is as interesting and important as the anatomical point of view, because it is the one from which the diagnosis of this nervous disease obtains a higher standpoint and a firmer basis.

We here see a striking illustration of the law of eccentricity, according to which the irritation of a sensitive nerve, wherever the irritant may act, is referred to the peripheral distribution. In the present case, the cause of the neuralgia lay within the cranial cavity,—still there was no pain within the head; but it affected only the superficial parts of the face. As the entire range of the three divisions of the trigeminus was affected by the neuralgia, it was to be assumed that the mass of the primitive fasciculi of the nerve was involved in the source of irritation; for this reason I determined that, previous to the cadaveric inspection being held, the seat of injury occupied the middle root of the trigeminus before it forms the ganglion, or in its passage through the pons or the crus ad cerebellum, because I was unacquainted with a case in which an irritating body had been found in the Casserian ganglion.

Another law, regulating neurophysiology, the law of isolated conduction, was equally useful in this case, in pointing to the diagnosis of the seat of injury. The sensitive portion of the trigeminus alone was affected; the irritation was not even communicated to the closely adjoining motor portion, nor to one of the other cerebral or spinal nerves, so that the cause necessarily resided in the middle root or within the ganglion.

Besides the neuralgic affection, the vertigo occurring in this

case, accompanied by a sense of inclination or rotation of the body to the left side, was remarkable. In the chapter on vertigo, we shall revert to the fact, that in vivisections the division of the pedunculi cerebelli ad pontem causes the animal to roll to the left side, and this often with such velocity as to produce a rotation in every second. In our patient, the left half of the pons Varolii and of the peduncle of the cerebellum were traversed by the softened filaments of the fifth pair; it is not too bold a conclusion, therefore, to look upon the affection of this peduncle, which was distinguished from its fellow on the right side by its softer consistency and more injected appearance, as the cause of the peculiar form of vertigo we have spoken of.

I admit my utter ignorance of the influence exerted by the aneurism of the carotid, in producing irritation and compression of the pituitary gland.

It is to be regretted that a sufficient amount of critical acumen has not been brought to bear upon the examination of the causes of facial neuralgia, and that acute neuralgia with a uniform type, and the chronic form presenting no type at all, have not been clearly distinguished. The former does not depend upon any particular constitution, but promiscuously attacks all ages, sexes, and stations. It occurs endemically in malarious districts; it has even been observed as an epidemic, and occasionally it is found in the train of intermittent fever. Facial neuralgia, with a chronic and irregular type, is much less frequent. It is unknown in childhood and youth, and generally occurs between the thirtieth and fiftieth years of life. Fothergill and Pujol have met with no patient who was under forty years of age. No etiological influence can be traced to sex. The wealthy classes appear to be more liable to it than the poorer orders,—the disease is therefore not often met with in hospitals. The influence of climate has not been accurately determined; but it probably occurs more frequently in the northern than in the southern latitudes.

Peripheral causes have not often been demonstrated. The case described by Jeffreys is remarkable on account of the coexistent histrionic[1] facial paralysis, and from having been

[1] [An apology is necessary for the introduction of this term, but mimic or imitative, which at first suggest themselves, as the English words corresponding to the

cured. A piece of china, broken from a cup, had lodged for fourteen years in the right cheek of a girl, and caused violent pains that were so persistent that she was not exempt from them for a single day. A hard, pointed body was felt under the skin; the slightest touch of the place induced an attack. The triangular piece of china was removed by an incision; and, two months later, the sensitiveness which remained after the operation, had entirely disappeared.[1] Cruveilhier[2] details a case of very severe neuralgia, in the course of the facial nerve, in a female affected with carcinoma of the mamma. Incomplete paralysis of the face occurred successively in the different branches of the facial. On dissection, the facial nerve presented nodes in all its ramifications, and it was invested in a carcinomatous sheath of irregular thickness.

No case has been published, besides the one just related, in which the peripheral cause of the neuralgia giving rise to the irritation of the fifth pair lay within the cranium, between the insertion of the nerve and its exit from the skull. At all events, it will serve to direct the attention of future observers more to the condition of the sphenoid bone and the carotid passing through it: independently of this, the vicinity of the three points of exit of the branches of the fifth pair should induce this examination.

At present we are almost ignorant of the causes which give rise to neuralgic affections of the fifth pair by acting upon their central parts within the brain and spinal cord; the case just given proves the importance of examining the pons Varolii carefully. Our knowledge of the causes originating in other organs is equally imperfect. The digestive and uterine organs are often suspected to be at fault, though without a sufficient reason, beyond that the assumption serves as an apology for the treatment. Occasionally it is possible to point to metastatic processes, occurring especially in mucous membranes and glands in the vicinity of the brain, such as suppressed catarrhs, otor-

German term, *mimisch*, would convey an erroneous meaning; it is hoped that *histrionic*, which etymologically is strictly analogous to the German term, will prevent a misunderstanding. The constant recurrence of the term rendered it absolutely necessary to employ a word that conveys the author's exact meaning. He invariably uses it to designate affections of the muscles supplied by the facial nerve.—Ed.]

[1] Descot, Dissertation sur les Affections locales des Nerfs; Paris, 1825, p. 99.

[2] Anatomie Pathologique du Corps Humain, livr. xxxv.

rhœal discharges, exutoria or ulcers. Arthritic and impetiginous affections, anæmia, influenza, malaria, and rheumatism favour the development of facial neuralgia.

Among the occasional exciting causes of the paroxysms, we must mention unexpected superficial touch of the seat of neuralgia, movement of the facial muscles, especially of those of mastication, the concussion of sneezing, irritation of the eye or the ear, mental affections, and fatigue, vivid attention to the pain. Some patients suffer more violent paroxysms by day than by night; others are more frequently attacked during sleep. Atmospheric relations exert an unquestionable influence. Almost all patients of this class have a painful presentiment of the change of weather. Draughts, wind, great heat and cold, dampness, and electric tension, give rise to a greater frequency and intensity of the attacks.

Diagnosis.—There is no nerve of sensation whose activity is so frequently called into play as the trigeminus; the number of filaments at its point of insertion allows the assumption that its cerebral connections are the most extensive of all. This accounts for the frequency and ease with which sympathetic affections are excited in the nerve, and for the difficulty of distinguishing them from genuine neuralgic conditions. To avoid this error it is necessary to attend to the following points:

1. The relations of facial neuralgia in regard to time and space; it is confined to certain distributions of nerves, and occurs in paroxysms separated by a free interval: in sympathetic pains we notice change of seat and extension of their range, and the pain is a mask to some other complaint, such as disease of the facial bones; when this becomes worse, the facial pain increases in a corresponding ratio. A case is detailed in the 10th volume of the 'Journal de Médecine,' in which the disease originated in a wound of the arm, and was cured after two years spent in torture, by cauterisation of the cicatrix. The case quoted from Swan (p. 21) is of an analogous character. Hunt[1] gives an instructive case of a woman who, when in the seventh month of pregnancy, was seized with violent toothache, recurring night and day in attacks lasting one hour, and with intervals of two. It occupied the ramifications of the infra-

[1] On the Nature and Treatment of Tic Douloureux, Sciatica, and other Neuralgic Disorders; London. 1844, p. 99.

orbital and supra-orbital nerves as to resemble tic douloureux. In the second night the patient was awakened by the pain, and the waters broke, the pains ceased, and the night after the sluggish action of the uterus being stimulated by secale cornutum, parturition was effected. During parturition the neuralgic pain attained its maximum, but ceased after its completion. The placenta was retained a considerable time, and when the hand was introduced into the uterus for the purpose of removing it, the pain instantly returned with great severity, and lasted whilst it was being extracted. It vanished immediately after this was done, and did not return.

2. The peculiarity of the exciting cause of the pain.

3. The sensitiveness of the affected surface of the face to unexpected and slight contact, especially if the disease be of long standing; strong pressure, at the same time, not only does not increase, but often diminishes the pain.

4. The preference shown by neuralgia of the fifth pair for mature age, as it occurs only after the thirty-fifth year.

5. The rarity of the disease, which must increase our scepticism in forming a diagnosis. Painful sympathetic sensations in the face belong to the daily experience of the practising physician; whilst cases of facial neuralgia, except of the acute typical kind, are counted among the rarities of medical experience, even in large and populous towns.

It is quite excusable that, until recently, anæsthesia dolorosa of the fifth pair should have been mistaken for tic douloureux, as the former has but lately been properly understood. The most important criterion by which it may be recognised, is the insensibility of the painful surface to irritation, while in tic douloureux the parts become morbidly sensitive to the most superficial contact.

It is not difficult to distinguish it from spasm of the face, whether of the histrionic or masticatory variety, for these affections are rarely marked by any pain. The convulsive actions occurring in facial neuralgia, are the result of reflex action, and take place against the will of the patient. It is thus that we must explain the rotations of the tongue and the distortions of the lips, described in the above case.

Prognosis.—The most marked difference is shown in the course of the disease as regards the prognosis. Acute typical

neuralgia of the fifth pair is generally curable, but is very liable to relapse. The chronic atypic forms are to be numbered among the diseases that most rarely cease, and may attain an advanced age with the individual without diminishing the duration of life by the agonies of pain.

The *spontaneous cures* of facial neuralgia are very rare; when they occur it is by transition into a disease of an allied and different character, such as gout, neuralgia, or impetiginous and ulcerative affections, whether on the face or at a distance; they may even take place by an entire disappearance of the disease by a process of resolution. In the case of a man of 72 years of age, who had been subject to neuralgia of the first and second branch of the right trigeminus for five years, I observed the sudden disappearance of the facial pains on the occurrence of herpes zoster in the right lumbar region; as the eruption dried up, the pain returned with its former severity, and obstinately resisted all the remedies employed.

Treatment.—We possess much hypothetical lumber, and a mass of clumsy empiricisms, but we are still much in want of trustworthy results as to the technical questions of treatment. There is only one result that we can safely promise; this is the cure of acute intermittent facial neuralgia, by aid of the vegetable or mineral antitypics, quinine, or arsenic. If, after a fair trial, we do not succeed with sulphate of quinine, given according to the violence of the paroxysms, in hourly doses of 2, 4, or 6 grains, which will rarely happen, we shall still find that Fowler's solution, at a dose of from 4 to 10 drops, will answer our purpose.

In chronic atypic neuralgia an effectual palliative would be a great boon to the tortured invalid; but all remedies that have been hitherto vaunted, either have no power whatever, or only retain it as long as they have the interest of novelty. Such are friction with and imposition of magnetic bars, washing with narcotic solutions, fomentations with solution of corrosive sublimate, the endermic application of morphia, rubbing it into the gums ($\frac{1}{4}$ grain of the muriate), or inoculating the skin of the neuralgic part with it by the lancet; we may also mention the local application of cold, cold insufflation, cold washing, the application of pieces of ice, steam-flying blisters, frictions, &c. Turnbull and others have recently recommended

the use of veratrine, employed in the following manner: an ointment containing twenty grains of veratrine to an ounce of lard is to be rubbed into the entire seat of pain during the paroxysm, for from fifteen to twenty minutes, until the warmth and pricking induced by the inunction is equal to the neuralgic pains. The friction is then to be desisted from for a short time, in order to let the irritation subside, and to allow the patient to compare the present pain with what he felt before the friction. We shall often find that the pain has been removed; but if any degree of neuralgic sensibility remains, the friction must be repeated until the peculiar sensations show themselves, and the pain will then probably cease. Should it still be obstinate, the patient must persevere with the friction until it is removed. The ointment recommended, is sufficiently powerful when the pain extends through all the branches of the fifth pair, but a stronger one may be required when it is confined to one spot; we may then take forty grains to the ounce. It is well to add the important caution, not to introduce the smallest portion of the ointment into the eye.[1] I had an opportunity of observing the palliative effect of the veratrine ointment in the case of a widow of fifty-three years of age, who for three years had suffered from neuralgia of the supraorbital and infraorbital nerves of the right side, without deriving any benefit from the various modes of treatment pursued; the veratrine ointment was beneficial at first, but, after three months, its effect was entirely lost, and I have since repeatedly made the same observation. Of late, aconitine has been recommended. Sir Benjamin Brodie had noticed that chewing the leaves of aconitum napellus caused a numbness in the lips, continuing for several hours. The alkaloid, which requires much care in its preparation, and is expensive, has proved effectual in several obstinate cases; it is used as an ointment, made with one grain of aconitine to an ounce of adeps, of which one third is to be rubbed into the neuralgic part two or three times a day. In the case of a London surgeon, who had for eight years been affected with violent neuralgia of the third division, this remedy removed it after inducing a numbness which lasted for twelve or eighteen

[1] Forcke, Physiologisch-therapeutische Untersuchungen über das Veratrin, 1837, p. 47.

hours; and the neuralgia had not returned at the patient's decease, which occurred six years later. Dr. Watson[1] mentions a few more cases in proof of its efficacy. The most recent suggestions for the palliation of the pain, are the inhalation of ether and chloroform. We do not as yet possess any scientific observations as to its effect in facial neuralgia.

For the radical cure of tic douloureux, we are directed to attend first to the removal of the exciting cause; and if this be insufficient, to make a direct attack upon the nervous affection. There can be no doubt that whenever we are able to ascertain or even to surmise a cause, the rules of practice demand that it should be first looked to. The physician will only be too glad to have something to hold by, and will be justified in expecting a beneficial result from the repeated use of the warm mineral waters; in derangement of the portal system, or, where there is a rheumatic constitution, Marienbad is to be recommended; Carlsbad or Marienbad would prove effectual in confirmed hepatic disease. The second alternative is most unsatisfactory; we should scarcely be expected, in any other branch of science, to attack a thing that we do not even know.

The most immediate cure was supposed to lie in a direct attack upon its seat by destroying the conducting power of the nerve. This idea was first carried into practice by Maréchal, a surgeon of Louis XIV, who divided the nerve. The value of this method and of the excision of a portion of the nerve, is at once determined by the neurophysiological law of eccentricity; according to which the central end of the divided nerve, if only the hundredth part of an inch in length, when irritated, causes the pain to be felt down to its extreme cutaneous distribution. It is only in morbid affections of facial branches of the fifth pair that operative interference could induce a hope of success, as in the case observed by Jeffrey; but unfortunately these cases are extremely rare. The decline of the surgical procedure is strong evidence against its value. But to apply it to the facial nerve, as some have suggested, is a great error, for this would increase the unhappy condition of the patient, by superadding to his sufferings the distortions resulting from paralysis of the motor nerve.

[1] Lectures on the Principles and Practice of Physic; 2d edit., 1845, vol. i. p. 695.

Among the local remedies by which it was supposed that the affected nerves were directly attacked, we must mention issues made by means of the actual cautery, as especially recommended by André. Although his view, according to which the nerve is destroyed, or the materia peccans allowed an exit, would not meet with much support at the present day, we must not forget that by irritating peripheral nerves, the state of the central organ may be altered. The results obtained by the application of an ointment of biniodide of mercury, (℈j to ℥j of lard,) as recommended by Scott,[1] must be explained upon this theory. Magendie has recently suggested the use of galvanism for the cure of facial neuralgia, and has detailed a few cases in evidence of its value. He introduces a very firm platinum needle into the painful nerve, and passes galvanic currents through it.[2] The effect is not permanent, and two of my patients complained of an increase of pain after the employment of electro-magnetism. Compression deserves to be more extensively tried. Earle[3] gives the case of a smith, who for some time had been subject to violent pain in the frontal nerve whenever he exerted himself. He invented an apparatus, composed of springs, protected by little cushions, by which he compressed the temporal artery, and was thus enabled to work all day long at the anvil. Compression of the corresponding carotid might also be useful.

A few specific remedies have been suggested for internal administration in tic douloureux, either upon hypothetical grounds, or for reasons of an analogical character. Thus Fothergill selected conium on the supposition of a carcinomatous constitution; Hutchinson praises the carbonate of iron with honey, in large doses, from half a drachm to a drachm three times a day. But both remedies have failed; and with regard to the latter, there must have been an error at the bottom, as sympathetic, and especially hysterical affections of the fifth pair, had evidently been mistaken for the disease in question. This is confirmed by Mr. Hutchinson's statement, (assuming that it deserves credit at all,) that within two years he had met with 200 cases of the affection in his practice. The united testimony of various observers agrees in

[1] Cases of Tic Douloureux and other forms of Neuralgia; London, 1834.

[2] Leçons, &c., pp. 125 and 238.

[3] Medico-Chirurgical Transactions, vol. vii, p. 187.

according to arsenic the chief place among metallic preparations; but it will not do to rest contented with such timid doses as might be worthy of an homœopathic quack. It must be exhibited in increasing doses, from three to ten drops of Fowler's solution, two or three times daily; it should be persevered in until the toxic effects show themselves, in sickness, a sense of fainting, formication in the toes and fingers, dryness of the fauces, and white tongue; then a pause should be allowed, and the solution be resumed as soon as those symptoms have subsided. No medicine has met with so much prejudice as arsenic; many practitioners object to $\frac{1}{40}$th of a grain—about the quantity contained in three drops, whilst they exhibit no fear of the deleterious effects of strychnine. The injurious influence of arsenic upon the reproductive system has been made a bugbear: the English reckon it among the tonic metals, and my own experience leads me to assert, that in the numerous and various diseases in which I have of late years employed arsenic, I have invariably seen an improved digestion, as marked by a better appetite, and have never observed any injurious consequences result from its use. I have repeatedly used nitrate of silver with good effect, but without permanent success. Small doses do not, however, suffice; it is necessary to give one grain and more. Those who have weighed the value of therapeutic observations in this disease, will pardon my not giving the particulars of other modes of treatment. My veneration for Sir Charles Bell's name, induces me to allude to his recommendation of croton oil, which this great man has adopted on the ground of the connection between intestinal affections and neuralgia. A poor carpenter, whose tortures reduced him so much, that he might have served as the painter's model for the last man, had employed the ordinary remedies in vain, when he applied to Sir C. Bell, and received from him the following prescription:

R. Ol. Croton, gtt. j;
Pil. Col. Co., ʒj. Misce fiant pilul., xij.

R. Pil. Galb. Co., gr. v, No. xii.

One of the former and two of the latter to be taken at bedtime. The pills operated quietly and powerfully. The pain subsided, and sleep returned. After a few weeks the patient returned

cured, and continued free from neuralgia until his death, which occurred four years after. Mr. Shaw found the brain and the fifth pair normal; but there was an ulcer in the ileum. The same remedy was found effectual in several other patients, though it is not stated whether the result was permanent.[1]

The repeated employment of sea baths, especially in warm climates, also promises satisfactory results; the continued application of cold, in the shape of affusion of the head and spinal column, as well as of the whole body, is also advisable.

Not only the external and internal surfaces of the face are supplied with cutaneous nerves by the fifth pair, but the membranous expansions of the organs of sense also receive, by its medium, their sensitive endowment, which essentially differs from the special function of the organ. This difference is well marked in the hyperæsthesiæ, and another circumstance is observed which is of physiological interest; it is the excitement or modification of pain by the irritation of the special sense itself, of the eye by light, the ear by sound, and so on. A peculiar relation to the nerve of special sense is thus established, the action of the latter being in this way interfered with by the pathological condition of the nerve of sensation.

[1] The Nervous System of the Human Body, 3d ed., London, 1844, p. 355; and Practical Essays, p. 84.

CHAPTER V.

CILIARY NEURALGIA.

Painful sensations in the eye, which are generally confined to one side, and are excited or increased by rays of light and by visual efforts, are the characteristic symptoms of this affection. In the higher degrees photophobia is present; this is therefore the term generally applied to the affection. The patient avoids solar and artificial light, as the bulb of the eye becomes painful when exposed to their influence, and the eyelids contract painfully. The pupil is contracted. The pain not unfrequently extends over the head and face. The eye generally weeps and becomes red. These symptoms occur in paroxysms, of a uniform or irregular character, and isolated or combined with facial neuralgia and hemicrania.

These phenomena have been attributed to an affection of the optic nerve, though unjustly, as this nerve is incapable of receiving any other impression but that of light and colour, and its hyperæsthesia is manifested exclusively by luminous phenomena, as its anæsthetic conditions show themselves by an inability to perceive light and colour. The optic nerve has nothing to do with the tactile sensation of the luminous rays; the possibility of a doubt on this subject is removed by the observation, that amaurotic individuals may suffer from photophobia.[1] The disturbance in the functions of the optic nerve occurring in ciliary neuralgia, proves the close relation that exists between the sensory nerve of the organ of sight and the special nerve of vision; this relation is equally demonstrated by the anæsthesiæ. A few ophthalmic surgeons have observed a distinct neuralgia of the lachrymal branch, which is said to show itself by darting pains in the region of the lachrymal gland, and by photophobia and sensitiveness of the eye, and by periodic weeping.

Scrofula is the main cause of ciliary neuralgia; it is also

[1] See the Description of Optic Anæsthesia.

brought on by discharges, especially seminal emissions, by helminthiasis, anæmia, and hysteria; the development of puberty, the exanthemata, measles, and scarlet fever, malaria, (the so-called intermittent ophthalmia in the main belong to this class,) extreme exertion of the eyes by fine work in a bright light, the combined fatigue of the eyes and of the mind, predispose to the complaint; want of exercise of the eyes, and withdrawal of the healthy stimulus of light, less frequently give rise to it.

A cure is difficult to be obtained, because, as in all affections of the organ of vision, the mind constantly dwells upon the disease, and thus a complete ophthalmic hypochondriasis results.

The therapeutic proceeding should be more of a dietetic than a pharmaceutic character. The influence of light must not be removed, but modified, unless the former is rendered imperative by a complication with other diseases of the eye. A rapid change of light must be avoided. The eyes should be protected by shades, broad brims to the hats or caps, or by blue spectacles. Variety in the mode of exercising the organs is desirable: people who are accustomed to work, requiring a close proximity of the objects to the eye, should exchange it for an occupation allowing a long range of vision; looking upon green fields, residence in pure dry air, the use of the cold bath, and sponging, are also beneficial. If there be a scrofulous taint, brine and sea baths and cod liver oil are advisable; if debilitating causes are to be traced, chalybeate medicines and baths are to be recommended. The debility of irritation indicates the propriety of washing the head with cold water, and of undergoing a course of whey.[1] If there is plethora or congestion, blood may be taken by cupping at the nape of the neck, or by leeches

[1] [Whey cures are extensively resorted to in different parts of the Continent, though more especially in Switzerland, and some mountainous districts of Germany. They are systematically carried out in Spring and Summer. Patients commence by drinking small quantities of whey, which are gradually increased, and are taken the first thing in the morning, cold or tepid. The duration of the course generally lasts about six weeks. Much exercise is taken, and a simple unirritating diet is prescribed. Whey cures are recommended in numerous constitutional disorders of a cachectic character, and in inveterate cutaneous disorders; the whey is prepared in various ways, with alum, tartrate of potass, wine, or tamarinds, and is ordered alone, or in conjunction with mineral waters, according to the requirements of the case.—Ed.]

applied behind the ears. Irritating and heating local applications should be entirely avoided. Jüngken[1] is strongly in favour of the cold eye-douche, especially with water impregnated with carbonic acid gas, which he orders to be applied twice a-day for half an hour each time. Several cases which resisted every other mode of treatment, were cured by the application of pure carbonic acid gas. If there be an intermittent type, quina and arsenic are indicated.

[1] Die Lehre von den Augenkrankheiten, 2d edit., p. 812.

CHAPTER VI.

NEURALGIA OF THE LUMBO-SACRAL PLEXUS.

It is no proof of the progress of observation, that till very recently sciatica has been looked upon as the sole representative of neuralgia of the inferior extremities, nor has the affection even been faithfully described. Daily experience shows that there is no cutaneous nerve of the lumbar and sacral plexuses, from the arch of the pubis to the tips of the toes, which may not be affected by neuralgia; but the traditional account of a pain following the course of the trunk of the nerve, obscures the judgment, and the absence of an accurate diagnosis is disguised by conventional terms, as rheumatic pains, lumbago, and the like.

The lower portion of the lumbo-sacral plexus is more frequently affected with neuralgia than the upper portion, and pains occur more frequently in the course of the sciatic than of the crural nerves. We will therefore discuss the former first.

NEURALGIA ISCHIADICA.

Synon.—*Ischias nervosa postica Cotunnii—Sciatica.*

The chief feature of this malady is pain in the distribution of the cutaneous branches of the sciatic nerve; it varies according to the seat and number of branches affected. If the posterior, middle, or lower cutaneous nerves, as often happens, are the seat of neuralgia, the posterior or lateral surface of the thigh is the suffering part, the pain extending to the popliteal space and the calf of the leg. The superficial branch of the peroneal nerve is less frequently affected; in this case the pain extends down the external and anterior surface of the leg, and along the external and inner half of the dorsal surface of the foot. The long cutaneous branch of the tibial nerve is more often involved; the pain then shows itself at the external

malleolus and the outer edge of the foot. The plantar nerves are rarely affected, excepting the external tibial nerve, which supplies the heel.

The pain darts though these parts with the rapidity of lightning, up and down, cutting, tearing and burning, with extreme violence, increased by slight contact, or gradually becoming permanent with a gouging or crushing character. At the same time the patient often complains of an oppressive, painful sensation in the vicinity of the tuberosity of the ischium, not far from the seat of the sciatic nerve, and of pains in the sacrum. At times the sciatic pain rivals that of facial neuralgia. Lentin[1] mentions a patient in whom the ball of the right foot was the seat of pain; a slip of paper falling upon the ball, though covered with the stocking, excited the pain for several hours. The pain is most violent in plantar neuralgia, of which I have lately seen an instance in a woman of fifty-four years of age; her sufferings quite equalled those of tic douloureux. Hugh Ley[1] quotes two similar cases; and Descot[2] communicates one observed by Richerand,[3] in which the application of the actual cautery to the sole of the foot proved effectual. The latest edition of Bell's[4] works contains a case in which agonising pains occurred in the sole of the foot, against which the most powerful remedies were of no avail. Bell examined the patient a few days before his death, and discovered a hard tumour in the popliteal space lying in the tibial nerve, and originating in external injury. In addition to the cutaneous pain, the patients frequently complain of other abdominal sensations, such as a sense of cold, heat, itching, horripilation, or cold affusion.

Sciatica occurs in paroxysms varying in duration with a remittent, but rarely with an intermittent type. At the commencement of the disease they are more crowded together, later on they are separated by longer intervals. The attacks occur towards evening and at the beginning of night, the intermissions occur in the morning hours. There frequently is a persistent dull pain or numbness in the intervals, with tenderness

[1] Beiträge zur ausübenden Arznei Wissenschaft, Bd. iii, p. 129.

[2] Essay on Laryngismus Stridulus; London, 1836, p. 307.

[3] Dissertation sur les affections locales des nerfs; Paris, 1825, p. 305.

[4] Loc. cit., p. 370.

on pressure, especially at those parts where the skin immediately invests the bone, as at the knee, the head of the fibula, or the ankle.

This variety of neuralgia is almost always confined to one side, it is as often in the left as the right foot. It is very unusual to meet with cases of bilateral affection. Motion, especially of the leg and the foot, is impeded and painful; the patient feels as if his muscles were fettered. During the attack it is difficult to find a position by which the pain may be relieved. Some bend the limb, others extend it or vary its posture. Other disturbances of mobility also occur, such as contractions of the muscles, and especially spasms in the calves. Movement of the leg in bed, attempts to walk or stand, the concussion of coughing or sneezing, or straining in defecation, increase the pains of sciatica. The temperature of the affected side is rarely exalted; its colour is unchanged both during the attack and in the intervals. The leg becomes emaciated when it has long been kept immovable. Beyond constipation, which usually accompanies sciatica, no marked changes show themselves in the other functions, except that febricitations are occasionally observed at the commencement.

The entire duration of the disease extends from three or four weeks to several months. There is a decided tendency to relapse. It is rarely complicated with other neuralgic affections. Cotugno[1] states, that he has occasionally observed a combination with neuralgia of the ulnar nerve. The middle period of life, from the fortieth to the sixtieth year, is predisposed to it; infancy is exempt. The male sex is said by Home to be more liable to the disease than the female; I am unable to confirm his observation. It may be assumed that some endemic influence exists; for in Naples, as Cotugno states, it occurs frequently, while it is one of the rare affections in Berlin: in some parts of England (in Cumberland and Westmoreland) it is indigenous, and like all neuralgic affections, it is frequent in malarious districts.[2] Relapses are apt to be brought on at certain seasons, and especially in winter. According to Cotugno, who is the closest observer of the disease, the pains increase during the prevalence

[1] De Ischiade nervoso commentarius; Viennæ, 1770, p. 58.

[2] Macculloch; an Essay on the Remittent and Intermittent Diseases, including generally Marsh Fever and Neuralgia; London, 1828, vol. ii, p. 124.

of southerly winds and damp weather, and diminish under the influence of the north wind and a clear atmosphere.

Intestinal and uterine affections are the most common causes of disease—such as accumulation of fæces, a wedging in of the child's head in parturition, tedious labours, the latter months of pregnancy; then we have to mention bodily exertion, the lifting and carrying of heavy weights, a heavy fall, concussion, fracture, fatigue by forced marches or long rides on horseback; rheumatism, brought on by lying on a cold damp surface when heated, by standing barefooted, sleeping against a cold damp wall, or being wetted to the skin. It may also be caused by metastatic processes arising from the sudden or gradual suppression of long-standing sanguineous discharges, especially of hæmorrhoids and menstruation, suppressed lochia, perspiration of the feet, cachectic conditions, arthritis, and syphilis.

Diagnosis.—Until very recently, pain confined to the trunk of the ischiadic nerve has been looked upon as the pathognomonic sign of sciatica. But in reality we are unable to demonstrate the course of pain in two currents coinciding with the distribution of the tibial and peroneal nerves. In the case before us, as elsewhere, the pain is perceived according to the law of eccentricity in the terminal points of the cutaneous nerves of the sciatic; this I have convinced myself of by careful observation. There is one point in the trunk of the nerve, however, near its point of exit from the pelvis close to the tuberosity of the ischium, where the patients generally feel a fixed pain coincidently with the pain in the subcutaneous branches. This symptom resembles what occurs in administering a blow to the trunk of a nerve, for instance of the ulnar, when, in addition to the sensations in the extremities, a severe pain is felt at the point of injury, and of which no satisfactory explanation has yet been given.

Neuralgia of the sciatic must be distinguished from sympathetic affections of the nerve which frequently occur in hysterical subjects, or accompany morbid changes of the rectum or strictures of the urethra. The proper diagnostic appreciation of sciatica has been impeded by attending exclusively to the course of the sciatic nerve. Here, too, the definition of a peripheral nerve was limited to its superficial

distribution, and that part which is concealed in cavities and passages was overlooked. If we except the rare cases of sciatic neuritis resulting from injuries or ulceration of the thigh, that part of the nerve which lies within the pelvis in the lumbar and sacral plexus and near the spinal cord, is the one which, on being subjected to irritation, produces the neuralgic symptoms in the leg, according to the law of eccentricity. To this circumstance we must attribute the sympathetic affections and the implication of motility. The pain in the sacrum, which is commonly present, must be interpreted in this way; the affection of the motor fibres, which are in juxtaposition with sensory filaments in the sciatic nerve, and are generally subjected to the same influences, shows itself in the spasm of the calves, in the tremor of the muscles, and in the impaired motility. These phenomena are very palpable in a difficult labour, when the sciatic plexus is dragged and irritated by the head of the child. The parturient female feels the cutting, penetrating pain, not only in the sacrum, but in the thighs, the calves and the toes, according as the sciatic cutaneous nerves are irritated, one or more, in the pelvis. At the same time there are painful muscular contractions, especially of the gastrocnemii. The irritation of the sciatic nerve may be so considerable, as to leave an enduring affection, which threatens danger after the birth of the child. I have had occasion to observe three such cases. Valleix[1] has described a similar case, in which permanent lameness of one foot ensued. As we have no dissections, it cannot be positively determined, but it may be assumed, that in these cases neuritis had taken place in the compressed plexus within the pelvis.

In the cases which I have observed, the disease only affected one leg, and commenced both with pain and deranged motility. In one female the leg was convulsively thrown up, and there was violent pain; in all three the power of movement was impeded. The pain raged both in the thigh and in the calf, and with particular violence in the toes and the sole of the foot. Although neither the temperature was increased, nor swelling or tumefaction were present, a gentle touch sufficed to raise the pain to the highest pitch, for which reason the patients maintained their foot in one position, and implored their friends not to

[1] Traité des Neuralgies, p. 591.

touch them. The pains were accompanied by high fever, with a pulse ranging at 120—130, with sleeplessness and constipation, diminution and suppression of the lochia, and there were evening exacerbations.

Under suitable treatment, the violent pains and the fever yielded after a fortnight, but the convalescence was tedious. In all three cases the sensibility and motility of the affected leg remained affected; in one woman there was anæsthesia of the sole of the foot, so that she did not feel the insertion of a needle; in the two others, a troublesome sense of weakness continued when the foot was moved and fatigued. Two of these patients were women of the lower orders, and had been delivered with the forceps by an inexperienced person, and they were attacked by the pain within forty-eight hours. The third, a delicate lady of twenty years of age, was delivered by one of our most experienced accoucheurs with the forceps, and was seized with the affection on the tenth day.

Sometimes it is easy, at others difficult, to distinguish sciatic neuralgia from other painful affections of the leg; it is not easy to confound it with acute rheumatism, or with gouty pains. In regard to coxalgia, the local symptoms in the joint and trochanter, and the alteration in the length of the limb, have been supposed to offer the diagnostic marks. Irrespective of the difficulty of forming a diagnosis when the two conditions are complicated,[1] and of the fact, that the hip affected by sciatica may appear shorter than the healthy one, owing to muscular contraction, there is no doubt of the existence of diseases of the joints, which must be classed with neuralgic affections. These have been first carefully described by Sir Benjamin Brodie.[2]

The symptoms often point to the hip-joint; the patients have pain in the hip and knee, which is increased by pressure and movement, and causes the limb to be maintained in a fixed position. The pain is not confined to one spot, but extends over the whole thigh; the cutaneous coverings are more tender than the deeper seated parts; the patients complain more when the skin is raised and pinched, than when the head of the thigh bone is forcibly pushed up against the acetabulum. If the attention of the patient happens to be directed to the examination, the latter

[1] Rust; über-die Verrenkungen durch innere Bedingung, p. 53.

[2] Lectures illustrative of certain local Nervous Affections; London, 1837, p. 34.

may seem to increase the pain; but if an animated conversation be kept up, the operation scarcely produces an impression. There is no atrophy of the glutæi muscles, nor a flattening of the corresponding side of the nates: the entire aspect of the limb differs from that seen in the disorganisation of the joint. At times there is swelling of the thigh and the natis, and in rare cases even a circumscribed swelling is met with, but no abscess presents itself, no fluctuation occurs, and we cannot compare the phenomenon with anything more appropriately than with an unusually large wheal of urticaria. Although no deformity occurs by flattening of the natis, it is not unusual to meet with an arching of the pelvis backwards, which at the same time is raised on the diseased side, so as to form an acute angle with the spinal column instead of a right angle; this causes an apparent shortening of the limb, and the heel does not touch the ground when the patient stands up; this results from the predominating activity of certain muscles, and the yielding of the parts to abnormal positions. A remarkable alternation of heat and cold occasionally takes place, not only in the hip-joint, but also in the entire limb. In the morning it is cold, pale, and livid, in the afternoon warm, and in the evening hot, with gorged vessels and a shining surface. Spasmodic attacks in the muscles of the affected limb are not unusual. Convulsive movements follow a pinch or very slight touch of the integuments, which resemble the movements of chorea; sometimes the limb is violently thrown up by spasms. In these cases, there is always a sense of weakness, which predominates after the pains have ceased,—such a condition may last for weeks, months, or years, without any further evil consequences. The patients are almost always of the female sex, and rarely above the age of puberty; they generally suffer from irregular menstruation, and possess an hysterical constitution; hysterical fits precede or follow, and the two affections thus afford mutual alleviation and relief. At times a serious illness has preceded, which has left great exhaustion, or the patient may have laboured under depressing mental influences.

Our *anatomical knowledge* of sciatica has remained defective for the same reasons that have prevented the improvement of the diagnosis. Attention has only been directed to the course of the sciatic nerve in the thigh. But, with the exception of

the rare occurrence of neuritis, or of the thickening and induration of single nervous branches in the vicinity of old ulcers, or of the painful tubercles, the cases that have hitherto been examined, have presented no alternation of any consequence, in the course of the nerve along the leg, even where the disease had lasted a long time. Thus in an old woman aged 87, who had been troubled for more than forty years with sciatica, the sheath of the nerve was found to be of rather looser texture than in the normal condition, and the veins in the upper part of the nerve were varicose. Bichat[1] also found the same varicose distension of the veins in one of his patients. We even meet with fictitious post-mortem results; and it is customary in this matter to refer to Cotugno. We allude to the accumulation of serous fluid in the sheaths of the sciatic filaments. The post-mortem in question was so little satisfactory to the celebrated Neapolitan physician, that he observes: "Sed quin haec dissectio mihi pro eo ac voluissem satisfaceret, plurima obstitere;"[2] and at another place he pays no attention to it; for he says distinctly, "Quem (sc. nerv. ischiadicum) etsi fors non tulerit unquam in ischiadici cadavere investigare, *quod hac ischiade peremtus nemo nobis occurrerit* nunquam tamen dubiam morbi sedem stabilivisse putavi." (p. 11.) The case was one of a man who had previously suffered from sciatica, and died of typhus fever: there was œdema of both legs; the sciatic nerve of the affected side had alone been examined, and was found rather darker in colour. The sheath was thicker than it is normally, and from the middle of the tibia downwards, it was filled with a serous fluid; as putrefaction had already commenced, the other sciatic nerve was not examined, so that not even a comparison could be instituted. We cannot supply the deficiency in the morbid anatomy of this disease, except by a more comprehensive examination of the entire course of the sciatic nerve. Whenever the rare opportunity is offered of examining a person who has died of sciatica, the peripheral distribution of the sciatic nerve in the pelvis, in the lumbar and sacral plexus, and in the spinal canal, should be investigated, as well as the spinal cord itself. Nothing less than this will suffice.

[1] Dictionnaire des Sciences Médicales, vol. xxxv, p. 504.

[2] Loc. cit., p. 67.

In the consideration of the prognosis of sciatica, we must remember the great proclivity to relapse, and the possibility of a supervention of paralysis. We do not possess many instances of complete recovery; an increased sensibility, or a dull sense of numbness, generally continues for a considerable time in the affected leg.

A spontaneous cure takes place in the shape of resolution, or with critical symptoms, such as diarrhœa, menstrual, lochial, or hæmorrhoidal discharges. Sciatica rarely alternates with other neuralgic affections.

Treatment.—The point to which we must first direct our attention is the examination of the relation existing between the blood and neuralgia. The sudden occurrence of sciatica in a plethoric individual, not rarely induces a febrile and even an inflammatory condition, of which Cotugno has made a distinct inflammatory stage; it is the more likely to be developed where a menstrual or hæmorrhoidal discharge has been suppressed. The treatment to be adopted in this case must be antiphlogistic. If the inflammatory character is well marked, venesection is required, and may be repeated; the older authors have advised its performance on the foot of the affected side. If there are not sufficient grounds for this proceeding, local abstraction of blood, by cupping or leeching the lumbar and sacral region, or the anus, may suffice.

We have first to attend to the cause of the disorder. Especial regard should be had to the organs of the pelvis. Thus we not unfrequently meet with large accumulations of fæces in the intestinal canal, whose removal is coincident with the abatement of the neuralgia. If the uterus is at fault, owing to the child's head being impacted, parturition must be accelerated; if an inflammatory intumescence of the organ remains, local abstraction of blood becomes necessary. In the cases which I have just related, I ordered the application of leeches to the iliac region, and to the lumbar vertebræ with much benefit, followed by inunction with Ung. Antim. Tartar., and large doses of opium, with mild purgatives.

The remedy recommended by Dr. v. Basedow,[1] for the sciatica pains, which not unfrequently remain, even after easy

[1] Wochenschrift für die ges. Heilk. Jahrg., 1838, p. 636.

births, is the application of a roller to the leg from the toes to the poplitæal space, to be repeated as often as the pain recurs.

Metastatic and cachectic states must be treated according to the ordinary principles of therapeutics. The curative powers of mercury, where there was a syphilitic taint, may have given rise to the laudation which calomel has enjoyed in the treatment of sciatica. Fothergill[1] advises the exhibition of a pill, containing one grain of calomel, at bedtime, immediately followed by a draught, containing thirty drops of Antimony wine and twenty-five of Laudanum. If an effect is manifested rapidly, the dose of calomel is to be raised to two grains on alternate nights; if the pain is abated, the antimony and the opium are to be omitted. Fothergill assures us that he has rarely met with genuine sciatica (and we must say, he was peculiarly fortunate in this,) which did not yield to this method in a few weeks, and that he has rarely observed a relapse.

Where there is a rheumatic predisposition, colchicum, cod-liver oil, and above all, iodide of potassium, are to be recommended; for several years past, I have had repeated opportunities of noticing the rapid effect of the latter remedy, when given in doses of three, five, or ten grains, three times a day, in an aqueous solution. Graves[2] also praises the rapid powers of this remedy, having had occasion to try it on himself when suffering from a violent attack of sciatica. In obstinate cases, we may anticipate good results from the Russian or vapour bath and the steam douche, from the use of the warm baths and douches of Wiesbaden, Teplitz, Landeck, Warmbrunn, and Baaden.

In hysterical neuralgia of the joints, as described by Brodie, we must remember that hysterical attacks not unfrequently disappear suddenly without any appreciable cause of their cessation, and that recovery often takes place, in consequence of a powerful impression, of whatever character, made upon the nervous system. It is thus that things the most opposite obtain the reputation of being powerful remedies, influences both of a moral and physical nature. It is necessary to avoid the abstraction of blood and debilitating remedies, but especially issues and counter-irritants, which keep up the attention of the

[1] The Works of Dr. Fothergill, edited by Dr. Lettsom, vol. ii.

[2] A System of Clinical Medicine, p. 866.

patient to his local malady.[1] Travers recommends bandaging the affected limb. Indolent rest is to be avoided. Thorough improvement therefore rarely occurs so long as the patient is confined to her bed. The pain may be relieved, but a sense of weakness follows, which is a greater impediment to walking than the pain itself, and increases the longer the patient occupies the recumbent position. In reference to the general treatment, I refer the reader to the Chapter on "Hysteria."

If the pain continues unaltered after we have conscientiously sought to remove the cause, or if, as is often the case, we are unable with certainty to ascertain the cause, we must make an attack upon the neuralgia itself by means of certain remedies which appear to act by derivation or translation. Among these remedies the oleum terebinthinæ rectificatum, (sive æthereum, spiritus terebinthinæ,) has obtained the greatest reputation; it was first recommended by Cheyne,[2] in the year 1722, and was employed with great success by Francis Home,[3] and in modern times by Recamier and Martinet.[4] My own experience leads me to confirm this praise; I have not observed such rapid alleviation and cure to follow any other remedy as this one, though I cannot deny that I have found it ineffectual occasionally, nor have I found Martinet's assertion confirmed, that the specific operation of the oil of turpentine is manifested by a sense of warmth extending from the intestinal canal to the entire distribution of the diseased nerve, and by occasionally producing local perspirations. It should be given in a dose of from fifteen to thirty drops, and the most suitable form is the electuary, as in the following prescription:

R. Ol. Terebinth. rectif., ʒj;
Syr. Aurant. sive Mellis, ʒij.
M. Sumat æger cochleare amplum bis die.

The internal exhibition may be associated with its external

[1] A further Inquiry concerning Constitutional Irritation and the Pathology of the Nervous System; London, 1835, p. 272.

[2] On the Gout, § 71.

[3] Clinical Cases and Reports taken in the Royal Infirmary, Edinburgh, as delivered at the Clinical Lectures, &c., 1776-7.

[4] Mémoire sur l'emploi de l'huile de Térébenthine dans la sciatique et quelques autres nevralgies des membres; Paris, 1823.

application, by friction of the leg. Next in order to the oil of turpentine, arsenic (in the shape of Fowler's solution, increasing the dose from four to ten drops,) deserves to be employed in inveterate sciatica.

Another substance recommended on account of its specific action against sciatica, is the alkaloid of the veratrum sabadilla,[1] used chiefly externally in the shape of an ointment—

R. Pulv. Veratrin, ℈ss—gr. xv;
Adipis suilli, ℥j.

Of this, a portion the size of a hazel nut is to be rubbed into the thigh until a sense of numbness and pricking is produced. In the cases which I have hitherto observed, I have not found the efficacy of veratrine in sciatica confirmed.

The skin and intestinal canal have from time immemorial served for derivation and counter-irritation. Greek and Arabian physicians applied the actual cautery in the vicinity of the painful part. Cotugno deserves the merit of having recommended blisters in the treatment of sciatica, although his views which are based upon a doctrine of humoral pathology, that the artificial ulcers possess an attractive power, and thus draw out the fluid stagnating in the sheath of the nerve, is not likely to be adopted in the present day. Those parts of the leg are selected for the application of the blister, where the nerve is most superficial, as the head of the fibula, and a point four inches above the outer ankle. The emplastrum cantharidum should be spread upon a piece of linen four inches in length and four broad, and applied to the external side of the knee, like a garter. The ulcer is to be kept open for some time, though not too long; it is better to repeat the application. The secreted fluid is often unusually acrid and viscid. This method, which may be advantageously combined with endermic applications, has been followed with good results in several of my cases of inveterate sciatica, although they were not so rapid as Cotugno has observed them. Valleix is more in favour of flying blisters applied at different points than of maintaining a discharge from the blistered surface.

In these times of hydropathy it is necessary to warn

[1] Ebers, das Veratrin und seine Wirkungen nach eignen Erfahrungen, Wochenschr. für die ges. Heilkunde, 1835, p. 789.

against the abuse, or even against the use, of cold applications in sciatica; I have repeatedly observed the pains to be considerably and permanently increased by cold humid envelopes.

The counter-irritation to the rectum by means of acrid enemata, which was in use in former times to the extent of producing an inflammatory reaction, has deservedly fallen into oblivion; yet it is not long ago, that enemata with one ounce of oil of turpentine have been recommended to be exhibited once or twice a day in obstinate sciatica.[1]

To palliate the pain nothing is more suitable than the endermic application of acetate of morphia, from one quarter to one third, or half a grain, which on the occurrence of the pain is to be strewed upon the blistered surface. Marcet[2] praises the extract prepared from the seeds of the datura stramonium, from a quarter to half a grain three times a day; Cotugno is in favour of the employment of opium in clysters.

Change of air or residence in a different locality often produces permanent good results.

The diet should be bland, and spirituous liquors and spiced articles of food are to be avoided. The patient should not lie on a feather bed, but on a mattress. Both active and passive exercise of the foot is to be recommended during the intervals of the pain.

To combat the paralysis which may remain, we must have recourse to stimulating frictions, to electro-magnetism, to the douche, to sea, brine, and chalybeate baths, to the mineral waters of Gastein and Wildbad.

NEURALGIA CRURALIS.

Synon.—*Ischias nervosa antica Cotunnii.*

This variety of neuralgia is characterised by pain at the anterior and inner side of the thigh, and at the knee in the course of the upper cutaneous branch of the crural nerve (nervus saphenus minor); it rarely extends along the course of the internal saphenus nerve down to the dorsum of the foot, and the great toe.

Derangement of motility which generally is associated with

[1] Ducros; Lancet, Feb. 17, 1838.

[2] Medico-Chirur. Transact., vol. vii, p. 550.

the complaint, affects the thigh, and impedes or prevents the flexion or extension of the limb.

Crural neuralgia is met with much more rarely than sciatica, with which in other respects it shares the same symptoms, nor does the etiology of the two affections differ much. Thus the pelvic viscera, and especially the intestine, are sometimes at fault, of which the following case, given by Portal,[1] affords an illustration. A lady, who had a considerable curvature of the spine, was attacked three or four hours after dinner by very violent pains in the great toe of the left foot; they continued for a longer or shorter period, and generally ceased after a copious motion. The pain was rendered more intense by enemata until they were discharged. After her death, which was caused by a malignant fever, the lower false ribs of the left side were found curved in the iliac region, in such a manner as to compress the sigmoid flexure; owing to this, the fæces which were impeded in their passage acted upon the nerves of the lumbar plexus. Thus the affection of the crural nerve was produced, and manifested itself along the course of the internal saphenus nerve, and following the law of eccentric action, showed itself in the foot. Dr. Kilian has observed a case of crural neuralgia, which was brought on by an extensive reticular cancer of the sacrum. In a female of twenty-seven years of age, ten months before being seen, boring pains had presented themselves in the sacrum, after a fall from a considerable height upon this bone; they extended into the hips and thighs, and soon after impaired the mobility and power of walking. The right leg became the seat of violent intermitting pains, which returned in regular paroxysms every evening about ten o'clock, and lasted uninterruptedly till five o'clock the following morning. They commenced at the crural canal, and extended indefinitely over the entire extremity without any limitation of the parts. By day the patient only complained of sensitive points near the crural canal, in the vicinity of the internal condyle of the knee, and of the inner malleolus. The sensitiveness of these points amounted to pain on pressure being applied; every evening it increased and extended until at last the whole leg was painful. This process took place with such rapidity that the patient was

[1] Cours d'Anatomie Médicale, vol. iv, p. 276.

unable to indicate the direction in which the pain extended from the tender points. During the attack, the colour of the skin was unaltered, there was no turgor or collapse, the muscles were not contracted nor spasmodic; after some time the pains remitted, quitting the thigh, and gradually advancing to the extremity of the limb. At last, they also disappeared from here; it was unusual for another attack to occur; when this was the case, it seemed to result from a larger accumulation of fæces in the colon, for relief was immediately obtained by a free evacuation following the use of an enema. After an intermission of two months, a fortnight before her death, pains occurred in the sacrum, and not only in the right, but also in the left leg; secondary peritonitis ensued, which in twenty-four hours terminated fatally. A carcinomatous tumour was found to occupy the entire sacrum from its junction to the os coccygis, to the promontory; it was developed from the interior of the bone, had burst the anterior wall of the sacrum, and filled the entire pelvic cavity. The tumour presented various grades of development and consistency. The part adjoining the os coccygis was very hard and consistent, whilst the vertex of the tumour was perfectly soft, and contained several cavities varying in size, and filled with coagulated blood or the sanies of carcinoma. On the right side, there was at the upper part a perforation of the size of a pea, through which the contents of the tumour had been discharged into the abdominal cavity, between the coils of the small intestines. The small intestines were all pushed upwards, and the sigmoid flexure which passed down by the side of the tumour, was filled with hardened masses of fæces. The trunk of the right crural nerve was pushed a little forwards, otherwise it appeared normal. The vertebra ceased abruptly at the promontory, so that it was easy to introduce a finger from the pelvis into the patulous spinal canal.[1] Mayo[2] relates a case in which such intense pain affected the knee of a female that it was thought necessary to perform amputation of the thigh; it was ineffectual, for the pains continued. The patient died a few years later, and on dissection the posterior surface of the spinal cord was found covered with cartilaginous and osseous laminæ.

[1] Henle's und Pfeufer's Zeitschrift für rationelle Medicin; B. vi; I II., 1847, s. 24.

[2] Outlines of Human Pathology, 1836, p. 83.

Crural nuralgia, like sciatica, occurs in hysterical subjects, and if carelessly examined may be taken for an affection of the joint. The knee is very tender, but more sensitive to a pinch of the skin than to pressure: this sensibility extends some distance from the joint both upwards and downwards, the patient when examined, suffers less as soon as her attention is directed to these objects; nor does she complain much when the articulating surfaces of the tibia and femur are pressed together, provided movement of the joint itself be avoided. Generally, the leg is kept in the extended position, whilst in articular disease the knee is bent. Weeks, months, and years may thus pass away, and the knee still retain its natural form and size. Only occasionally a trifling swelling is perceptible at the anterior surface above, and to the side of the ligamentum patellæ; this must not, however, be confounded with a general tumefaction of the knee-joint, as it is the consequence of improper treatment by means of counter-irritation.[1]

Neuralgia of the upper cutaneous branch of the crural nerve is associated sympathetically with coxalgia, and is manifested by pain in the knee (gonalgia,) rendering every movement of the thigh, and especially the extension of the knee, difficult; in part it prevents it altogether, and rages chiefly at night.[2] The knee is so tender that the slightest touch is insupportable. Rust states, that the pain only accompanies the first stage, that of elongation of the femur, and that it arises from tension of the muscles and nerves. According to Stromeyer,[3] it occurs both in that stage of elongation and shortening of the femur; he asserts that it takes place whenever the hip-joint is maintained bent by a tonic spasm of the psoas and internal iliac muscles, and that therefore every attempt to extend the limb increases the pain in the knee. Stromeyer justly rejects the mechanical explanation which refers the pain to a tension of the nerves, for it is not even increased by pressure applied externally to the hip-joint. The same rules laid down for the treatment of sciatica apply in the present instance.

[1] Brodie; Lectures illustrative of certain local Nervous Affections, p. 40.

[2] Rust; über die Verrenkungen durch innere Bedingung, p. 37.

[3] De combinatione actionis nervorum et motoriorum et sensoriorum sive de sensuum impressionibus musculorum actione effectis; Erlangen, 1839.

No author has hitherto spoken of neuralgia occurring in the distribution of the obturator nerve, the cutaneous terminations of which supply the inner surface of the thigh. I am the more anxious to direct attention to pain in the course of this nerve, as a symptom, as it is of importance in recognising a condition dangerous to life.

The wife of a merchant, aged 50, of a delicate constitution, the mother of five children, had eight years previously induced a crural hernia of the left side, by lifting a heavy weight. Although the truss afforded sufficient protection, she was seized from time to time, by attacks of colic, accompanied by nausea, vomiting, dysuria, and violent contracting pains in the hypogastrium; the latter extended to the inner side of the right thigh, in which the patient often experienced a sensation, which she compared to cramp in the calves; she was then unable to lift up the leg; not unfrequently she had a feeling of numbness, as if the limb went to sleep. These attacks yielded to the employment of anodynes and of warm fomentations; pains of the left arm and left breast which supervened, confirmed the diagnosis of a neuralgic affection. The infusion of Tissot had been used during the last two years with good effect,—the attacks of colic ceased. An inclination to costiveness still remained, and the patient on bending down or lifting up the legs while sitting, often complained of a peculiar crunching sensation in the abdomen. In the beginning of September 1846, the colicky pains returned, but soon yielded to the usual remedies. Three weeks after they returned one evening, while the lady was taking a walk; there was a dull heavy pain in the cæcal region, which was moderately increased by touch. It was more vivid on the inner side of the right thigh, and was augmented by movement of the limb. These symptoms were accompanied by constipation which had lasted forty-eight hours in spite of purgative pills, by a peculiar painful sensation in the epigastrium, and a small tense pulse of 96 beats. The hernial regions were examined, but showed nothing abnormal. The soothing remedies formerly applied, and repeated laxative enemata, produced no effect. On the following day, in addition to the enduring constipation, eructation, dryness of the mouth, thirst, and a sense of fainting supervened. The mesogastric region was somewhat distended and tympanitic on percussion,

whilst the cæcum sounded duller than usual; on the third day the symptoms demonstrated the supervention of gangrene of the intestine. The tip of the nose and the tongue became cold, the hands and the feet cool, the pulse frequent, 120 small, irregular, intermittent, the skin was flabby, and a fold pinched up on the neck was not effaced for a long time. The thirst was insatiable, and there was a constant longing for cold water; at the same time, there was a sensation at the pit of the stomach, which was more overpowering than the most violent pain. The patient described it as a dissolution of life; there was slight transitory drowsiness, the eyelids remaining half open and the eye-balls being turned up; the costiveness was persistent, vomiting of stercoraceous matter ensued, and there was tympanitic distension of the abdomen with slight tenderness. The patient had ceased to complain of the painful sensations in the thigh. On the fourth day, the extremities were of an icy coldness, the pulse was vermicular and intermittent, there was stercoraceous vomiting, and in the night unconsciousness and death ensued.

The details which I have given of the course of the disease, renders it unnecessary to relate the treatment which the ordinary attendant of the lady, the late Dr. Horn, conducted in conjunction with myself; it was not long before we anticipated the fatal issue. I did not consider that we were justified in assuming the ileus to be due to an internal strangulation, as the attacks had formerly been frequently repeated, as well as on account of the pains in the thigh. I was rather inclined to assume a disorganisation of the cæcum, or the presence of a morbid growth behind it, which might press upon or drag the nervous plexuses of the right lower extremity, and thus give rise to the pains experienced in the skin and the muscles.

The body was examined twenty-eight hours after death, and a few points of the surface of the small intestine were found reddened, though the corresponding mucous membrane was unaltered. At a short distance from the cæcum, the lower portion of the ileum formed an acute angle at the foramen ovale of the right side.

A small coil of intestine, of the length of the third digital phalanx, penetrated the foramen, and became visible on removing the obturator and pectinæus muscles; it was strangulated

by the fibrous membrane, so that it could not be replaced in the abdominal cavity though considerable traction was employed. It was only released by incising the membrane; the incarcerated coil still, however, continued to be completely separated from the remainder of the intestine. When the thickened hernial sac was opened, a small quantity of serous fluid escaped, the coats of the strangulated portion were considerably thickened, the mucous membrane presented a blackish discoloration, and the passage at the point of incarceration was so completely obstructed, that merely a thin probe could be passed. The adjoining part of the ileum, to the extent of three inches towards the stomach, was of a livid colour, the mucous membrane, gangrenous, forming a villous pulp, the muscular coat similarly disorganised, but the serous membrane unaltered; some of the mesenteric glands in the vicinity of the gangrenous portion of intestine were swollen. Where the former hernia had been, the omentum was found to form a firm chord attached to the posterior edge of the left poupart ligament. Without penetrating the inguinal or crural canal, the ascending colon adhered laterally to the peritoneum by broad transparent old adhesions.

The peculiar point of interest in this case is not its rare occurrence, but the elucidation of the diagnosis by a nervous symptom. The obturator nerve must be exposed to pressure and traction, in every case of hernia, through the obturator foramen; and, if the contents of the hernia are an intestinal coil, we shall find symptoms of *strangulation of the nerve* superadded to the phenomena of strangulation of the intestine. The sensitive fibres of the obturator nerve, which are the cutaneous nerves of the inner side of the thigh, as well as the motor fibres supplying the adductor muscles of the thigh, manifest this derangement by more or less vivid pain at the inner side of the thigh, by a sense of numbness and formication, and inability to bend the limb. In a few cases given by older observers, we find this pain spoken of as accompanying ileus, without attributing to it any diagnostic value. Thus Garengeot, who lived in the middle of the last century, and has merited well of the history of obturator hernia, relates that the first patient treated by him for this affection had fallen on her back after parturition, that the symptoms of ileus ensued, but

unaccompanied by tension of the abdomen or fever. When asked whether she suffered pain, she answered that she had immediately experienced an unpleasant sensation in the abdomen, associated with a pain at the inner side of the right thigh, which continued and increased as often as she vomited.[1] Oudermann[2] relates a case which is peculiarly instructive, by the *post-mortem* account he gives; we quote the following particulars:—on the fifth day the patient had stercoraceous vomiting; she knew of no rupture, nor was anything of the kind to be found in the hernial regions. It was only during the last days of her life that she was troubled with any pain; it occurred at the inner and upper part of the thigh, descending from the inguinal region inwards and downwards; nor was any tumour to be felt even here, nor any palpable sign of a rupture. A recent valuable observation[3] contains no mention of these symptoms of incarceration of the obturator nerve; but if the absence of those symptoms is not expressly stated, their not being attended to proves nothing. Whoever is well acquainted with the anatomical relations of this hernial region, as they are now presented to me by a beautiful preparation of the pelvic fascia, by the experienced hand of my colleague Dr. Schlemm, cannot doubt of the necessary existence of that nervous symptom.

A pathognomonic symptom for obturator hernia, as presented to us in the combination of pain and impaired motility of the thigh, associated with an interruption to the permeability of the intestine, is of the more importance because this species of rupture only forms gradually. It is, in fact, a chronic complaint rarely presenting any external visible tumour, and exposed more than any other rupture to temporary and repeated incarcerations. In the female sex, in whom this variety of hernia chiefly occurs, these circumstances may easily mislead the physician to assume a nervous hysterical affection, a mis-

[1] Ueber den Bruch durch das Hüftbeinloch, nebst einem seltnen Falle hierüber; Landshut, 1823, p. 4.

[2] Mémoire sur plusieurs hernies singulières, in Mémoires de l'Académie Royale de Chirurgie, vol. i, p. 699.

[3] Beitrag zur Diagnose der Einklemmung der Hernia foraminis ovalis vom Hofrath Dr. Roeser, in Roser und Wunderlich's Archiv für Physiol. Heilk., 1846 5 Jahrg., 3 H. S. 408.

take which is only likely to be confirmed by the apparently neuralgic character of the pain of the thigh.

The value of this nervous symptom is not confined to diagnosis, but becomes practically useful; there is no doubt that had the nature of the disease been recognised early in our patient, she might have been preserved by an operation. "Qui sine peccato est vestrum primus lapidem mittat." Henceforth a stricter judgment will be exercised; at all events, the pure surgeons will consider the nerves with more attention and affection; it seems as if they already gratefully acknowledged the benefits conferred upon them by distinguished surgeons, of whom it is enough to quote Bell.

CHAPTER VII.

NEURALGIA OF THE BRACHIAL PLEXUS.

Neuralgia occurs less frequently in the brachial than the crural plexus, and chiefly attacks the internal cutaneous nerve and the cutaneous branches of the ulnar and radial nerves. Nor have I here observed a radiation of the pain in the course of the nerve, but have heard the patients complain of periodical shocks and starts of pain, especially in the ramifications supplying the corresponding fingers. The patients almost invariably complain of a sense of numbness like that which is well known to be produced by striking the elbow. This sensation is stated to continue during the intervals, and to accompany these varieties of neuralgia more frequently than others; pain is most easily excited by touch and pressure applied to those parts at which the nerve is nearest to the surface, and not covered by layers of muscle, as at the inner side of the elbow, or at the ulnar or radial surfaces of the fingers. The movements are impeded and painful, even out of the paroxysm, but the rapidity of motor conduction, as compared with a healthy extremity, is unaltered.

I have not been able to discover any fixed type in these varieties of neuralgia. At times the attacks of pain follow one another so rapidly, that an appearance of continuity is produced. Intervals of greater or less duration then occur, which are generally ascribed, both by physicians and the patient's friends, to other circumstances than those inherent in the nature of the morbid affection.

This neuralgia is less frequently isolated than sciatica or tic douloureux; it combines with other affections of an allied or different nature, with cervical and intercostal neuralgia, and, according to Cotugno's observation, with sciatica of the same side, and with cardiac neuralgia (angina pectoris); the latter I have myself seen alternating with neuralgia of the ulnar nerve.

The female sex seems more liable to it than the male: hysteria is a strongly predisposing circumstance. Diseases of the heart, and especially affections of the valves, not unfrequently induce pain of the ulnar, and at times of the radial nerve, especially of the left side. In hepatic disease similar phenomena occur in the right arm, the pain taking the course of the cutaneous branch, sent to the shoulder from the axillary nerve. A rheumatic constitution may frequently be distinctly demonstrated to exist.

In regard to treatment, we cannot hope for the same results that purgatives afford in neuralgia of the lumbo-sacral plexuses. In five cases of ulnar neuralgia, Cotugno[1] obtained the most marked benefit from the application of blisters, and by maintaining their discharge. Valleix is more in favour of flying blisters. I have met with a palliative effect from inunction with veratrine ointment, and have obtained a radical cure of pure neuralgic affections, by the use of the warm baths of Wiesbaden and Aix-la-Chapelle, and especially by employing these waters in the shape of douches.

CERVICAL AND INTERCOSTAL NEURALGIA.

Valleix has deserved well of the study of these affections, for which he deserves the more credit, because he has thus assisted in more correctly interpreting many a fact, which in modern times has been classed with the protean forms of spinal irritation.

The lower cervical nerves bear to neuralgia of the arm a similar relation to that existing between the upper (especially the second and third, from which the occipital nerves branch off,) and neuralgia of the posterior surface of the head. The pain extends from the upper cervical vertebræ to the vertex, the external ear, and the mastoid process; occasionally it remains limited to a few small spots, but may be complicated with painful sensations in the face, or of the lower jaw, if the upper cutaneous nerves of the neck are affected. The pain occurs by jerks and starts, as in other neuralgic affections, both while the head is at rest and during its movements, which the patients avoid during the attack.

The sensation is so superficial that even the hairs partici-

[1] De Ischiade nervosa commentarius; Viennæ, 1770, p. 119.

pate, and, as I have occasionally observed, the patients fear contact; they complain, even in the intervals, of a dull sense of numbness, and do not well bear strong pressure with the finger, applied to parts covered with muscular layers.

It is necessary to be on the guard against confounding occipital neuralgia with periostitis and diseases of the vertebræ. We here meet with tearing pains, occurring especially at night and in paroxysms, at the back of the head and neck, and shooting upwards to the vertex, as well as downwards to the shoulders and upper arm; but the movements of the head continue impeded during the intermissions, and it can only be rotated at an expense of considerable pain. We may add a symptom, which has already been noticed by Rust, as pathognomonic, that as soon as the patient attempts to exchange the recumbent for the upright posture, he has a difficulty in raising his head without assistance, and that to do this,[1] he supports the occiput with his hand.

In the distribution of the dorsal nerves we meet with neuralgic diseases both on the anterior and posterior surface of the trunk, as well as on both coincidently. The intercostals are most frequently affected, the disease being more commonly seated in several of the nerves than in a single one, especially in the middle and lower branches of one side, and particularly of the left; the pain either encircles the waist like a girdle, or starts up at certain spots near the vertebræ, the sternum, or the thorax, tearing, dragging, and agonising the patient. It is increased by a gentle touch, but relieved by strong pressure. It is not long since I saw a patient who had for many years suffered the most intense neuralgia of the left side of the thorax, and whose dress was rubbed through at this point by the constant application of the hand. Movements, especially of a respiratory character, such as coughing and sneezing, excite and augment the pain, though respiration itself is not impeded. A dull sense of numbness continues during the intervals.

Similar neuralgic phenomena manifest themselves occasionally in the posterior and anterior branches of the first lumbar nerves.

The most fertile source of this variety of neuralgia is, the

[1] See Romberg's klinische Ergebnisse, 1846, p. 3.

female sex, (nearly three fourths of these patients are females,) anæmia and hysteria. It occurs with the most various complications. It is most frequently associated with neuralgia of the gastric branches of the vagus, as manifested by pain in the region of the seventh and eighth dorsal vertebræ, along the lower ribs, chiefly of the left side, and at the pit of the stomach, and rising to the chest and neck in the shape of pyrosis and globus hystericus.

We must here devote some attention to a painful affection of the mamma termed mastodynia neuralgica, with which the researches of Sir Astley Cooper have made us acquainted.[1]

One or more points of the mamma become very painful and tender to the touch. The pain resembles tic douloureux, passes through the breast and the neighbouring nerve like an electric shock, running up to the shoulder and arm-pit to the inner side of the elbow, and to the fingers, and sometimes descending to the hip. When it reaches its climax, vomiting frequently supervenes; the patients are unable to lie or sleep upon the affected side; the weight of the breast in bed raises the pain to the most intense degree; heat and cold alternate in the breast; the colour of the skin remains unaltered; and no trace of inflammation is visible.

The painfulness is increased before the period of menstruation, is less during its continuance, and diminishes after it has ceased. In some cases only a small portion of one breast is affected; in others its entire circumference; and not unfrequently both breasts at the same time. This state of things may continue for months, or even for years, with rare intermissions, but without any tendency to a malignant character. Young females between the age of sixteen and thirty are most liable to be attacked. The disease is not observed before the development of puberty, though it is occasionally met with at an advanced age.

A peculiar kind of tumour occurs in the mammary gland, which might be termed neuralgic (irritable tumour of the breast). The tumour has a sharp outline, is very tender to the touch, from time to time most intensely painful, and especially so before the menstrual period; it is very movcable, and varies in size from that of a pea to a marble. Generally there is only

[1] Illustrations of the Diseases of the Breast; London, 1829, p. 76.

one, though there may be several; though it lasts for years, it does not increase, nor does it suppurate; it ceases occasionally to be painful, and disappears without any apparent cause. On examination, these tumours are found to consist of a firm semi-translucent substance, in which fibres are irregularly scattered; nerves cannot be traced into them; they appear rather to be a produce of the cellular tissue of the breast than of the glandular structure, and they occur in the cellular tissue of other parts accompanied by similar symptoms. They are distinguished from other tumours, from hydatids, scirrhus and fungus, by the accompanying pain, the tenderness on the slightest touch or pressure, and the enduring pain following a local examination. Irritability of constitution predisposes, and it is commonly accompanied by derangement of the catamenia and fluor albus. The patients generally attribute it to a blow, a push, or to pressure from some portion of the dress.

There is a remarkable etiological relation between herpes zoster and intercostal and lumbar neuralgia; whoever has had occasion to observe this disease, must at times have found it difficult, from the pains that preceded or followed, to determine whether he should class this affection with the neuralgiæ or with skin diseases. Thus Rayer[1] quotes a case in which there was only a single patch of vesicles below the scapula, but a very severe pain in the left side, extending like a girdle from the spinal column to the sternum. I venture to suggest the possibility of another etiological influence, to be found in the vicinity of the blood-vessels in the intervertebral foramen, as their extension and morbid changes necessarily affect the adjoining nerve, more or less. The vertebral artery deserves to be especially regarded in this respect, as diseases connected with ossification of the cerebral vessels, such as softening or hæmorrhage, are frequently accompanied by complaints of severe pain in the region of the occipital nerves.[2]

These varieties of neuralgia are very enduring; they continue for years; and the effect of remedies is very doubtful. Remissions may take place under the most opposite treatment. The first thing to be attended to is the improvement of the patient's

[1] Traité théorique et pratique des Maladies de la Peau: 2d edit., vol. i, p. 335.

[2] See Bright,—cases illustrative of the effects produced when the Arteries of the Brain are diseased. Guy's Hospital Reports, vol. i, p. 9.

constitution. In the majority of instances, steel, especially the sesquioxide of iron, the potassio-tartrate of iron, and the natural or artificial chalybeates, are indicated. The value of arsenic has to be determined by future observations. A satisfactory result may be expected from the employment of the warm baths and douches of Wiesbaden and Aix-la-Chapelle; whilst nothing but aggravation and increased obstinacy of the neuralgia is to be looked for in the present fashionable remedy of the cold wet sheet. I have seen two convincing cases of this kind, in which even sea baths failed of their effect. Among the local remedies, flying blisters, veratrine, (we do not possess sufficient evidence in favour of aconitine,) the oleum terebinthinæ ætherum, and wearing a hairskin, are found to afford relief.

Mastodynia, whether complicated with a tumour or not, requires to be locally as well as generally treated. The topical application most praised by Sir A. Cooper, is a plaister consisting of equal parts of ceratum saponis and extractum belladonnæ, or a poultice of bread crumbs with a solution of belladonna. The breast may be advantageously covered with oiled silk, a hareskin, or some other fur. Leeches are only advisable if the pains are very intense; if employed too often they increase the debility and irritation. For internal exhibition, calomel is recommended in combination with opium and conium, with an occasional laxative, followed by a pill like the following:

℞. Extr. Conii;
Extr. Papav., āā gr. ij;
Extr. Stramonii (e seminibus), gr. ¼—ss.
M. Fiat pilula; pilula talis bis vel ter die sumenda.

To restore the menstrual functions we must give carbonate of iron, ammonia, citrate of iron, mist. ferri comp., alone or in conjunction with aloes. Hip-baths of sea water, or of ordinary water with salt, are advisable. Operative measures are not required, though timid patients often insist upon removal of the tumour, from fear of carcinoma.

CHAPTER VIII.

PRURITUS—FORMICATIO.

Hyperæsthesia of the cutaneous nerves is not characterised by pain, but by other manifestations of sensation, the physiological condition of which has not as yet been determined. The more frequent of these are itching and creeping. The frequent occurrence of itching in cutaneous diseases, when it is a mere accidental symptom, has induced nosologists to include it altogether in this class of affections; and they have classed it with the papulous disorders, under the name of *prurigo*. An eruption of small vesicles of nearly the same colour as the skin, and when scratched becoming covered with a little black scab, is said to be present in many instances, and to be absent in others: for this latter reason a *prurigo sine papulis* has been adopted. Nor is it confined to vesicles; pustules, furuncles, and abscesses may follow, the pruritus all the while continuing unaltered. We cannot, however, doubt that causes and consequences have here been confounded: whoever will take the trouble to observe a simple pruritus of the sole of the foot may convince himself of this. During the painful restlessness which preceeds, and at the time of the occurrence of the itching, no change whatever could be observed in the skin. If the itching increases the surface becomes red, its temperature rises, and little nodules make their appearance. These disappear on the decline of the attack; but continue and become torn and bloody if the patient cannot keep from scratching. Nevertheless, the pruritus ceases to return after a definite or indefinite period. The nodules can scarcely be considered as an idiopathic exanthema, but they arise in consequence of the hyperæsthesia, in the same way as disturbances of the secretion and the like occur in other hyperæsthesiæ. The itching rarely affects the entire body; it is generally confined to limited parts, and generally gives a preference to those covered with hair.

The second and third branch of the fifth pair, with their nasal, and occasionally their lingual filaments, the articular branch of the vagus, the lumbar and the sacral plexuses, are most frequently the seat of this hyperæsthesia. The pudendal and hæmorrhoidal nerves are especially liable to be the seat of annoying irritation in either sex; described by Willan and others under the different names of *prurigo pudendi muliebris, prurigo scroti,* and *prurigo podicis.* Of the cutaneous nerves of the extremities the plantar branches of the tibial nerve are most frequently affected, owing to which the interstices between the toes and the sole of the foot become the seat of the most agonising itching. Nor are the superficial nerves alone affected; for pruritus also occurs in the mucous membranes of the urethra, the vagina, and the rectum.

It may present a periodic character, and even occur regularly at the time of the catamenia, and with hæmorrhoidal discharges, or it is persistent, with nocturnal exacerbations.

Early and advanced age affords a predisposition to the affection. Suppressed sanguineous fluxes, especially from the uterus, or from hæmorrhoids, frequently induce it. Hepatic disease bears a distinct relation to pruritus: this is a well-known fact in regard to icterus; but I have repeatedly seen violent plantar pruritus without jaundice, but evidently dependent upon hepatic disturbance. Joseph Frank[1] has met with pruritus of the mamma under similar circumstances. Intestinal irritation, especially induced by lumbrici, excite annoying pruritus of the nose. Stone in bladder gives rise to itching of the glans penis. Certain substances taken into the stomach are known to produce it occasionally, as spirituous beverages, muscles, and especially opium. Dr. Bally[2] states that pruritus is a sure sign of poisoning by morphia. Nor should the influence of the mind be overlooked. The sight or remembrance of an itching object frequently excites pruritus even at the identical spot.

Allied to pruritus is the sensation of *pricking,* as experienced in what is called the going to sleep of the extremities, and *formication,* or the sense of ants creeping over the skin.

[1] Medic. univ. præc., vol. viii, sect. ii, p. 377.

[2] Lembert, Essai sur la Méthode endermique, p. 31.

Hippocrates[1] speaks of the sense of formication along the spine as a symptom of tabes dorsalis; and although it is by no means constant or pathognomonic of the disease, it is of physiological interest, because it can only be interpreted, like the pain in the cutaneous nerves occurring in diseases of the central organs, according to the law of eccentricity. Formication occurs as the consequence of poisoning in the disease called ergotism, which arises from the consumption of spoilt rye. The external and internal exhibition of veratrine also induces an annoying sensation of pricking at various points of the body, more particularly in the toes and points of the fingers. Generally, however, formication accompanies anæsthesia.

The *treatment* of pruritus is very unsatisfactory; we must regret this the more as this variety of hyperæsthesia, by maintaining great restlessness, reacts injuriously upon the mind. A cure is more easily affected in children than in old people, in whom the affection generally resists all remedies. In plethoric individuals, and after the suppression of sanguineous discharges, the abstraction of blood by cupping is indicated; in the former the employment of the mineral acids, the muriatic and nitric, are advantageous. In senile prurigo diuretics have been recommended on the supposition of an imperfect secretion by the kidneys, the result they afford does not, however, answer expectation. Baths may be advisable, and sea baths, or such to which bolus alba[2] has been added, may be employed. Even palliatives have been sought for in vain. Frank[3] has recommended Plenk's ointment for prurigo of the scrotum and pudenda, viz.:

℞. Ungt. Hydr. Nitr., ℥j;
Adipis, ℥ss;
Hydr. Precip. Rubr., ℈j.
S. Mane et nocte parti affectæ infricandum.

No experiments have as yet been made with veratrine ointment.

[1] See Convulsio cerealis, in the part treating of the neuroses of motility.

[2] [Bolus alba is described in the Prussian Pharmacopœia as a mineral to be found in various places, of a friable, whitish character, easily melting in water, and consisting chiefly of clay.—Ed.]

[3] Loc. cit., p. 384.

ARDOR AND ALGOR.

The perception of physical warmth is also conducted by the cutaneous nerves of sensation; this power does not, according to Bell's observation, appertain to the sensory nerves of the muscles, for when these are exposed in surgical operations they exhibit sensitiveness on the application of hot or cold water, but are stated to be incapable of appreciating a change of temperature. It follows that ardor and algor occur as cutaneous hyperæsthesiæ; they are manifested by a sense of heat and cold, which does not correspond with the indications of the thermometer.

A common form is ardor volaticus s. fugax; it is characterised by a hot flush passing over the forehead and chest, especially the face, and occasionally accompanied by the appearance of a thin perspiration. After a few minutes this phenomena disappears as rapidly as it appeared. I have generally met with it in females about the climacteric period, and after the cessation of the catamenia; it is associated with mental excitement and great restlessness, and though it often obstinately resists all the remedies tried, it may, after a few years, yield of its own accord. The superficial character of the symptoms easily induce the practitioner to abstract blood, but this is rarely of use. I have seen the most benefit result from the use of the mineral acids, in such a form as the following:

> R. Elixir. Acidi Halleri, vel Elixir. Vitrioli Mynsichti, ʒj;
> Elixir. Aurant. Comp., ʒij.
> Dose, 30 drops three times a-day.[1]

The chilliness accompanying the numbness of the limbs forms a contrast with the hyperæsthesiæ just spoken of: we shall advert more fully to it in the chapter treating of anæsthesia, as well as of the sensation of cold confined to a small spot, algor circumscriptus. The individuals are almost always

[1] [Elixir acidum Halleri, the Mixtura sulphurico-acida of the Prussian Pharmacopœia, is made by dropping slowly one ounce of rectified sulphuric-acid into three of rectified spirit. The Elixir vitrioli Mynsichti, or tinctura aromatico-acida of the same pharmacopœia, is prepared by dropping half an ounce of rectified sulphuric acid into a pound of aromatic tincture.—Ed.]

females with an hysterical diathesis. The symptom generally occurs on the scalp, and occasionally on the skin of the abdomen; it appears in paroxysms and again vanishes, together with the other hysterical symptoms. We shall speak of the aura as the forerunner of epileptic attacks, when we examine into the nature of this disease.

CHAPTER IX.

HYPERÆSTHESIA OF THE NERVES OF MUSCULAR SENSE.

We are informed, on the one hand by anatomical inquiry, that the voluntary muscles are supplied with sensory fibres; while, on the other, our daily experience proves that these muscles possess a sense of a peculiar character distinctly manifested in health by the fatigue or lassitude resulting from exercise. This peculiar character also shows itself in the hyperæsthesiæ which so frequently precedes the outbreak especially of febrile diseases, or accompanies other affections, and more particularly those of an hysterical character. In the latter there is often a sense of painful restlessness in the lower extremities, especially in the legs and feet, which the patients, as they are apt to say, do not know what to do with; they try in vain to obtain relief by a change of position. The older nosologists (Astruc, Sauvages,) have termed this symptom *anxietas tibiarum.*

When the muscular sense is exaggerated so as to amount to actual pain, it also presents a peculiar character; it is the feeling of dislocation or rupture, and in most cases it is accompanied by spasm of the muscle and impeded motility, by which the coexistent affection of the motor fibres is evidenced.

It is not, however, the painful exaltation of muscular sensibility alone which becomes an object of perception, but every alteration in the condition of the muscle may be perceived. Thus the healthy individual perceives motion or rest, and he becomes conscious of any variation as regards the facility or difficulty with which his muscles accomplish their duty. Nothing but a nerve can serve to conduct this sensation; and, if there must be a nerve to communicate the impulse of the will to the muscle, there must be a second nerve which reconducts the sensation of action, and this is the nerve of muscular sense.

Bell[1] possesses the merit of having directed attention to this point; his observations are as ingenious as they are conclusive.

In this manner, we not only become conscious of changes taking place in our muscles, but also perceive definite relations of the external world to our body. The different impression produced, for instance, by the resistance of the ground we tread on to the muscles of the sole of the foot, gives rise to the sensation of firmness or vibration. The blind man can distinguish, as well as the person endowed with sight, whether he is ascending or descending a hill, or whether he is moving his arm in an horizontal or vertical direction. We determine the weight of objects placed in our hands solely by the sensation conveyed through the sensitive muscular nerve.[2] The sensation of muscular action is of the greatest consequence with regard to the function of sight. The perception of the movement of visual objects depends as well upon the progress of the image upon the retina as upon the sensation of the muscles of the eye, being reduced to consciousness; the fatigue of these muscles operates injuriously upon the power of vision, and appears to be the cause of the painful affection, to which hitherto the term *hebetudo visus* has been applied. The affected eye at first sees equally well with the healthy eye, in close proximity and at a distance, and is equally able to distinguish clearly the most minute objects; but the power of endurance in the exercise of this function soon ceases; almost with every moment the patient loses this facility of accurately discriminating. Objects placed at a small distance apparently become confused, and a rapidly increasing, and at last insupportable sense of weight, tension, and fatigue, in the orbital and frontal region, force the patient entirely to desist from continued exercise of his eyes; if he perseveres, headache and giddiness supervene. In some cases, slight capillary injection of the conjunctiva, and accumulation of tears, has been observed; the eye blinks with greater rapidity without affording relief, and at last the eye must be entirely closed, or for a time directed to more distant objects; all the annoying symptoms then disappear, to recur

[1] The Nervous System, &c., 3d ed., 1836, p. 196.

[2] See the excellent investigations of E. H. Weber, de pulsu, resorptione, auditu et tactu; Lipsiæ, 1834, pp. 81—113.

as soon as the eye is again occupied with very near objects. This condition is graphically described by Böhm,[1] and we refer to his excellent monograph for the further details. He does not, as is generally done, admit that the malady depends upon an absence of visual power, but he believes it to be owing to the weariness of the nerves and muscles, which are too weak to accommodate themselves to short distances, and exhibit their fatigue by the above-named symptoms. The best results are experienced by the employment of convex glasses.

The same law applies to the sensitive muscular nerve, which rules other sensory nerves; that external causes are unable to produce any kind of sensations, which we are not also capable of experiencing independently of those external exciting causes by the consciousness of the condition of our nerves. In the present instance, it is manifested in a sense of *illusory movement*, or *illusory position*, which we consider as the characteristic trait of the disease, termed giddiness or

VERTIGO.

The sensation of illusory movement generally attacks the individual suddenly and without premonitory symptoms; consciousness is unaffected, and it is referred by him, either to himself or to surrounding objects. He feels as if he were going to fall, or were turning round, or as if everything else were doing so. This sensation is invariably preceded, accompanied, or followed by another symptom, the sense of disturbed balance. With these main features other phenomena are associated, though they are less constant, as optical or acoustic hyperæsthesia, (coruscations, tinnitus aurium,) painful sensations in the head, especially in the occiput, nausea, vomiting, trembling, with cold perspiration, muscular tremors, a full, slow, or small and frequent pulse, flushing and pallor of the face, and cold feet.

The direction in which the movement appears to take place varies. Both the Greek and Latin terms for the affection indicate a circular movement; δῖνος denotes an eddy, a circular

[1] Das Schielen und der Sehnenschnitt, in seinen Wirkungen auf Stellung und Sehkraft der Augen., 1845, pp. 109—146.

dance; and vertigo appears to be copied from it. Wepfer,[1] to whom we are indebted for some excellent observations on the subject, distinguishes three varieties:—vertigo *titubans*, vertigo *vacillans* sive fluctuans, and vertigo *girosa;* in the first the body appears to move backwards and forwards; in the second the movement seems to be to one side; and in the last rotatory. Boerhaave[2] establishes a distinction between *vertigo* the circular and *nutatio* the vertical illusory movement.

The different directions in which the movements seem to occur, is a horizontal or vertical circle, the circumference of which is before or behind the patient, sometimes pass into one another, or alternate in the same individual. Wepfer[3] describes a case of this kind in the following terms: "Aliquando omnes tres species vertiginis in uno paroxysmo adsunt, quandoque sola vacillans seu ex uno latere in alterum nutans, et putat caput instar navis ad latera a fluctibus percussæ nutare ac vacillare; quando titubans est, putat sibi supine non prone nec in latere, cadendum esse; imo fere supine prosterneretur nisi sustentaretur."

The illusory movement may, when it affects the body of the individual, seem to engage the whole or separate portions, as, for instance, the head. A girl of eight years of age was under my care, to whom during attacks of vertigo the surrounding objects appeared to mount from below upwards, and who at the same time had a sensation as if the head, and especially the forehead, became too high.[4] Wepfer in the passage already quoted says, "Paroxysmos precedit tinnitus aurium et videtur sursum capillis caput trahi;" and in another passage, "caput semper antrorsum vergere videtur."[5] Canstatt relates the case of a patient affected with nocturnal vertigo, who, during the period of his attacks, was waked up regularly at 3 o'clock in the morning by giddiness; he screamed for help, begging to be raised, as he thought he was standing upon his head; he never suffered from horizontal vertigo; if he turned

[1] Observationes medico-practicæ de affectibus Capitis internis et externis; Scaphus, 1727, pp. 217—314.

[2] Prælect. acad. de morb. nervor. cur. v. Eems; Lipsiæ, 1762, p. 476.

[3] Loc. cit., p. 285.

[4] Romberg zur Lehre von dem Schwindel, in—Wochenshrift für die ges. Heilk., 1833, p. 1057.

[5] Loc. cit., p. 249.

round quickly enough upon his right side the giddiness vanished, and equally if he jumped rapidly out of bed.[1]

The position of the head at the commencement of the vertigo exerts an influence upon the direction and seat of the illusory movement. Wepfer[2] says, "Quando sedet, putat inferiorem truncum antrorsum et retrorsum moveri; quando decumbit, moveri videtur caput solum hoc modo, quando sinistro lateri incumbit, minor adest hæc fluctuatio."

It is necessary to define more accurately the relation existing between the sensation of illusory movement to muscular action, to the senses, and to consciousness. When the consciousness is unfettered there is no real movement which corresponds to the apparent movement; but the sensation of a disturbed balance is at times so considerable that it overpowers the will struggling against the impression, and the patient falls (*vertigo caduca*). Among the nerves of sense, the optic nerve is most frequently drawn within the range of the affection. Double or chromatic vision, or coruscations, almost invariably accompany the attacks of vertigo, and the rotatory movement of visible objects may attain such a degree of velocity that everything appears enveloped in mist and darkness, (σκοτόδινος, *vertigo tenebricosa.*)

Those patients who *complain* of the illusory movement and the disturbed balance, prove by doing so, that their consciousness is unaffected; accordingly the will continues to be active. They try to secure themselves against the abnormal sensation, which threatens to carry the body away with it, by means of movements which require some force for their execution, as by stretching out their arms, by planting the feet firmly, or by pressing the trunk against a support. If the freedom of consciousness is interrupted a different train of symptoms occurs, as in the vertigo of dreams occurring in sleep, (vertigo nocturna.) The direction of the apparent movement in these cases is rarely rotatory, it is generally from above downwards, dreams of tumbling down a staircase being most common; or it may be upwards, or backwards and forwards, variations which probably depend upon the position of the head. People also dream of sinking into the earth, of an illimitable chasm opening before them, or of houses threatening to overwhelm them,

[1] Klinische Rückblicke und Abhandlungen, 1848, p. 81. [2] Loc. cit., p. 294.

and the like. Vertiginous diseases occur most frequently in those who suffer from giddiness in the waking state. Wepfer[1] remarks, "Unice de vertigine sollicitus est, quæ ipsam quoque decumbentem in tecto et in somno invadit; hac vespere indormire ante primam non potuit, et quando indormiebat, insomniis etiam vexabatur, ac si vertiginem pateretur et cum ancilla recidisset, unde perterrita mox expergefiebat." If consciousness be impaired during the waking state, and the will have lost its power, no resistance is offered to the impulse to move in a certain direction, and the apparent movement is converted into a real one. Drunkenness affords daily evidence of this.

The giddiness occurs in paroxysms ordinarily of short duration; they may continue from a few minutes to a quarter of an hour, but rarely more. The attacks recur with more or less frequency, being sometimes repeated several times in the day, or even in the hour. We rarely find a uniform type. The disease is frequently chronic, and may continue for a series of years. The chief predisposition exists in middle life and advanced age, childhood is generally exempt. I have only observed a few cases of its recurrence in the latter; one occurred in a boy of three years labouring under meningitis from which he recovered, and who, on the first day of the disease, and during sleep, often screamed out, in great terror, "I am falling." Giddiness is induced with more difficulty in children by rapid rotatory movements than in adults, they therefore bear it better. A plethoric constitution and sedentary mode of life, especially in the climacteric period of women, favour the origin of this affection; we also find that debility brought about by exhausting discharges, especially spermatorrhœa, and the convalescence from other maladies, predispose to it. The continued employment of spirituous liquors is also apt to induce it.

Among the causes of vertigo, the state of the blood occupies an important position, and we find that both an increase and a diminution in the supply of blood are followed by vertigo. Thus it commonly accompanies diseases of the heart, and especially hypertrophy of the left ventricle. On the one hand we find vertigo induced by suppressed hæmorrhoids, menstru-

[1] Loc. cit., pp. 227 and 286.

ation, epistaxis, or the omission of habitual abstraction of blood; on the other, hæmorrhages, whether undeveloped or intermittent, arthritis, or trichoma,[1] pregnancy, and the pressure of tumours in the abdomen, are to be classed in this category; not unfrequently the affection is caused by injury and diseases of the brain, and especially of the cerebellum, or by epilepsy, for the paroxysms of which vertigo is not unfrequently substituted. Diseases of the præcordial organs, such as the spleen, &c., are often accompanied by giddiness; and future investigations will have to determine whether definite forms of vertigo depend upon the affections of different organs. The more frequent exciting causes are, intoxication by alcoholic liquors, and by narcotics, as from nicotiana, especially from smoking, from belladonna, digitalis, hyoscyamus, or carbonic acid gas. We must also mention gorging of the stomach with indigestible articles of food, with carbonated beverages, the stage of incubation of other diseases, especially of a febrile and contagious character; also unusual movements or positions of the head, as continued stooping or sea voyages, interrupted or suppressed respiration, straining in defecation or parturition; affections of the mind, vivid impressions of the senses, especially of the retina, with residuary images, atmospheric influences, the spring and autumn seasons, and sudden diminution of atmospheric pressure.

The artificial production of giddiness in healthy individuals has long been an acknowledged fact, but we owe it to Purkinje[2] that this matter was first introduced into the range of experimental physiology. This distinguished philosopher describes some of the more ordinary conditions of vertigo in the following words:

"The illusory movements affecting the sense of touch, and having a reference to the weight of the body and limbs of the individual, causes both the former and the latter to appear suspended according as the conditions of the sensations are varied. If to each hand a weight relatively of considerable magnitude be attached, and we carefully watch the sensation

[1] See J. P. Frank, Opuscula Posthuma, 1824, p. 237.

[2] Beiträge zur näheren Kenntniss des Schwindels aus heautognostischen Daten. In, Medicinischen Jahrbüchern des KK. oestr. Staates., 1820, vol. vi, p. 78 seqq.; and, Ueber die physiologische Bedeutung des Schwindels und die Beziehung desselben zu den neusten Versuchen über die Hirnfunctionen; in, Rust's Magazin für die gesammte Heilkunde, 1827, vol. xxiii, pp. 284—310.

produced by gravitation, it will appear as if every moment an addition were made to the weight, until at last it becomes impossible any longer to support the enormous burthen. If after holding the weights for a certain time in the erect position they be put down, it appears as if one were induced to mount straight upwards, and as if the hands which were let down to hold the weights were considerably shortened, and must, as it were, creep into the thorax. If anything was held in the closed hand, it appears afterwards as if the hand were constrained to double itself up into a fist."

If we institute similar experiments with the muscles of the eye, still more striking results are afforded, and we find, on account of the altered relations to the activity of the sense, that the impression of apparent movements of visible objects is produced.

For instance, if we look fixedly at an object quite to one side of the body, it appears to vanish in that direction, and the eye will be required constantly to exert itself anew to retain it.

Vertiginous sensations are most easily and powerfully induced during and after oscillatory and especially by rotatory movements of the body of an active or passive character; the direction of the apparent movement is determined as established by Purkinje's[1] observations, by the position occupied by the head during and after the rotations of the body. "If the face," says the author just quoted, "be turned to the ceiling, and the eye be fixed upon a given point, round which, as the pole of a vertical axis, the body is turned a certain number of times, the visible objects of the ceiling, as well as the floor of the room, will, if the position of the head and the direction of the eyes be maintained, appear to move in an horizontal direction. If during the proceeding the head be brought back into the ordinary upright position, the direction of the horizontal movement of the vertigo will be converted into that of a vertical wheel; this sensation will also be communicated to the tactile sense of the hands and feet, the floor appearing to sink down on one side and to rise on the other. If, in addition to the axiliary rotations of the body, the head be inclined as strongly as possible to either shoulder, and the individual experimented upon be arrested after making a number of rotations sufficient to produce the sensation of vertigo, and the head be then

[1] Purkinje, in Rust's Magazine, &c., p. 290 seqq.

brought back into the vertical position while the body is firmly supported, the field of vision and the objects in it will appear to the eye and the touch to be tumbling over from before backwards or the reverse, according to whether the rotations have been effected while the head was turned to the right or the left." It follows from all these experiments, that the section of the head as of a globe, round the axis of which the true movement took place, always determines the apparent movement of the objects during the subsequent position of the head when the rotation is arrested; the same applies to attacks of vertigo, as we have before stated.

The vertiginous sensations are to be distinguished from others that occur when the eyes are closed, and in blind people; these Professor John Müller has accounted for by referring them to the after effects of visual impressions upon the retina. If, for instance, the eye has been fixed for any length of time upon the undulations of running water, and be then suddenly turned to terra firma, the ground appears to move in a direction contrary to that of the water. Assuming that a series of after impressions remained in the eye which successively disappear, the passage of these secondary impressions while the eye is bent on the ground will necessarily produce the appearance of the ground moving in an opposite direction.[1] The visual giddiness will be excited the easier, even by trifling and transitory impressions, the more irritable the retina.

We have yet to discuss the manner in which the brain participates in vertigo; as the organ of the soul, it reduces the vertiginous sensations to consciousness, and converts them into conceptions of space. We will not even venture a supposition as to whether the excitement occurs by definite channels, as we might assume it to do, from the influence exerted by the position of the head, and the modifications of the real movements produced by injuries of certain parts of the brain, inflicted for the purposes of experiment;[2] we prefer adhering faithfully to our determination of avoiding the region of impossibilities.

We will not detain the reader by futile investigations into the proximate cause of this hyperæsthesia. We are warned

[1] Müller's Physiology, Dr. Baly's edition, vol. ii, p. 1179.

[2] See the Chapter on Neuroses of Motility.

by the history of the theories of vertigo. Sauvages' theory of a retrograde movement of the blood in the retina, and the views of Marcus Herz, who attributed vertigo to a psychical influence, have alike, and justly, been consigned to oblivion, because they failed to satisfy the simplest demands which can be made to the theory of a disease, viz., of careful and satisfactory observation of its phenomena. Visual vertigo was selected as the type of the disease, and little recked the theorists that sleeping, blind, and narcotised individuals also suffered from the affection.

Nosology.—The older nosologists assumed a false relation between this variety of hyperæsthesia and consciousness, inasmuch as they placed vertigo among the hallucinations. Modern writers have erred equally, in dividing the subject into visual and tactile vertigo, and vertigo of space and of time. The physiological element of classification must be taken from the seat of disease in a definite organic apparatus, and the activity it displays. In this way, vertigo is explained as hyperæsthesia of sensitive muscular nerves, which rarely proceed from the peripheral, but generally from the central nervous apparatus.

Prognosis.—We should not allow ourselves to be misled by Boerhaave's[1] dictum: "Vertigo est omnium morborum capitis levissimus et facillime curabilis, unde omnes alii capitis morbi incipiunt et qui, hisce curatis, sæpe relinquitur." Every central neurosis is in itself important, and only ceases to be so when the cause has been removed. The vertigo that is caused by profuse discharges and exhaustion, is curable, whilst it is beyond the reach of the healing art when it accompanies cerebral disorganisation. Vertigo, resulting from hæmorrhage, is more easily curable than that which is brought on by the suppression of habitual sanguineous discharges. It not unfrequently ceases on the eruption of other diseases as epistaxis, otorrhœa, hæmorrhoids, arthritis, and trichoma. The middle period of life is favorable to it. In vertigo caduca and tenebricosa, the prognosis is said, by older authors, to be more unfavorable than in simple vertigo.

The *treatment* of vertigo depends upon the cause, constant regard being had to the constitution of the individual. In

[1] Prælect. acad. de morbis nerv., p. 475.

idiopathic vertigo it will be necessary to see whether mere erethism is at the bottom of the complaint, or whether already material alterations have taken place. In the first instance, acids (the elixir acidum Halleri, elixir acidum Mynsichti, acidum phosphoricum,)[1] and nux vomica, in powder, from one to three grains twice a day, are to be recommended. In the second case, we must have recourse to the local abstraction of blood, especially cupping at the occiput and nape of the neck, issues and cold effusion, which, if they do not cure, may relieve. In consensual vertigo, we must chiefly attend to the state of the digestive organs, and well distinguish between mere repletion of the stomach with undigested matters and atony. In the former case, evacuants, and even emetics may freely be employed, in the latter, the bitters, such as menyanthes trifoliata, or quassia, in combination with rhubarb. Diseases of the spleen and the liver deserve especial attention. In metastatic vertigo issues are most beneficial. If plethora or suppressed sanguineous discharges give rise to the complaint, venesection and local abstraction of blood must be employed. Vertigo, arising from profuse discharges and exhaustion, must be treated with tonics, of which the dose is to be gradually increased.

We may add the following rules, as generally applicable to the treatment of patients subject to vertigo: they should avoid violent, continuous, or rotatory exercise, abstain from highly nutritious and heating articles of diet, and suppers: they should not indulge in much sleep, or the use of feather-beds, or of (warm) baths. Counter-irritation to the skin by sinapisms, footbaths with mustard or ley, the use of the fleshbrush, with cold washing of the trunk, and the exhibition of cooling laxatives, are to be recommended; such as the following:

℞. Flor. Sulph.,
Cremor Tart., āā, ℥ss;
Res. Guaiac., ʒj.
Fiat pulvis. Cochleare minus mane et nocte sumend.

℞. Magn. Sulph., ʒvj;
Magn. Carb., ʒij.
Fiat pulvis. Cochleare minus ter die sumend.

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[1] [Vide suprà, p. 89, note.—Ed.]

Small doses of bitter water[1] may be taken in doses of a wine-glassful before going to bed, and the first thing in the morning.

As a palliative, the patient should be recommended, before the supervention of an attack, to direct his full attention to movement. The patients do this, in a measure, of their own accord, by supporting themselves firmly, with their hands and feet, in order to resist the illusory movement. The sense of vision may be employed for the same purpose; thus the vertigo, produced by rotatory movement of the body, may be suppressed, by looking steadily at the finger held up to the eye, or by turning round in a direction opposite to the previous movement.

[1] [The waters of Saidschütz and Püllna are commonly known in Germany as bitter waters; their chief properties depend upon the sulphates of soda and magnesia, which they hold in solution; the latter also contains a minute quantity of iron, and is considered more digestible than the former. Two ounces taken in the morning, generally suffice to produce a free evacuation.—Ed.]

CHAPTER X.

HYPERÆSTHESIA OF THE VAGUS.

The title of this Chapter itself is intended to suggest that this powerful nerve of sensation does not show an exaltation of its sensibility by *one* mode of expression, as pain, but by a variety of peculiar sensations, according to the specific manifestations belonging to the different subdivisions. The experiments made upon living animals afford some clue to this matter,[1] but the pathological conditions in man, though complicated, afford more distinct and trustworthy information, as we are assisted by the communications made by the patient. We will first examine that variety of hyperæsthesia of the vagus which manifests itself by pain; viz.

NEURALGIA OF THE RESPIRATORY AND GASTRIC BRANCHES OF THE VAGUS.

Neuralgic symptoms occur more frequently in the latter than in the former. In the respiratory branches they occasionally assume the character of pruritus; the tickling sensation felt at the bifurcation and inducing cough, is not only met with as an accompaniment of bronchitis,[2] but may occur with any complication. I have seen rare instances in which the patients complained of a sense of cold passing up the trachea, though the air expired was warm; the subjects were affected with hysteria. The pruritus occasionally shows itself in the auricular branch of the vagus, and its character is proved by the cough and even vomiting accompanying it.

In the gastric distribution of the vagus, the neuralgia is ordinarily met with in three forms; as a sense of constriction of

[1] We refer the reader especially to the excellent researches by Arnold, in his Bemerkungen über den Bau des Hirns und Rückenmarks, nebst Beiträgen zur Physiologie des zehnten und eilften Hirnnerven; Zürich, 1838, p. 106 seqq.

[2] Stokes, on Diseases of the Chest, p. 54.

the pharynx, of burning in the œsophagus, and of tenderness of the stomach. The former is known as globus hystericus, the second is included under the head of pyrosis, and the last I term gastrodynia neuralgica. The globus hystericus is generally looked upon as a motor affection, or spasm of the pharynx; but liquids and solids pass equally well through the gullet: one is not justified, even if there is a sense of constriction, in assuming a spasm of the pharynx. My view is corroborated by the fact that the ball appears to *rise* in the throat—the symptom occurs most frequently in hysteria, hence its appellation; it is occasionally a precursor of epilepsy. This variety of neuralgia is rarely manifested as a mere sense of pain in the pharynx. Hedland[1] relates the case of an amaurotic female labouring under a tumour of the pituitary body and disorganisation of other parts of the brain, who suffered such intense pain in the pharynx, which was otherwise perfectly sound, that she felt assured there must be a tumour in the part.

In *pyrosis,* a sensation of heat and soreness passes from the stomach up to the gullet, which may or may not be accompanied by a flow of gastric juice or saliva. Gout, hypochondriasis, and pregnancy, predispose to the affection. Abstinence from greasy articles of food and from spirituous beverages, and the continued exhibition of bitters, as quassia combined with rhubarb, generally effect a cure.

GASTRODYNIA NEURALGICA.

Attacks of painful sensations in the stomach, varying in kind and intensity, pressing, tearing, stretching, alternate with intervals of rest and freedom from pain. The pain is not generally increased by pressure from without or within (repletion with food), but rather diminishes on its application. There is almost always continued appetite, amounting at times to voraciousness. Sympathetic sensations, globus hystericus, pain in the back, and dysuria, are rarely absent, while reflex action of the abdominal muscles, tympanitic distension, vomiting, eructation, and yawning, are ordinary accompaniments. Nutrition remains unimpaired even when the disease is of long standing.

A predisposition to the affection exists in the early and

[1] Ammon's Zeitschrift für Ophthalmologie, vol. v, p. 367.

middle periods of life; it is also favoured by hereditary constitution, hypochondriasis, hysteria, and gout. It cannot be denied that an especial relation exists between this neuralgia of the vagus and the uterus. Chlorosis and fluor albus are frequently associated with it, and in many females the return of menstruation is announced by gastrodynia. This is the reason of the great prevalence of the malady in the female sex. We also find that it is often due to profuse discharges, especially of semen, and to masturbation.

The disease has a chronic character: the prognosis is on the whole favorable, though treatment is often ineffective, and the affection may only disappear with advancing age. There is little difficulty in distinguishing it from disorganisation of the stomach, such as chronic inflammation, ulceration, or scirrhus, when these are fully developed; but at their commencement it causes much difficulty—for which reason mistakes are not unusual. The following may be enumerated as safe means of establishing a diagnosis: 1. The effect produced by pressure. In neuralgic gastrodynia the most superficial touch instantly produces pain; whilst firm compression produces no inconvenience or even relief; the reverse is the case where there are structural lesions. 2. The function of digestion; this is disturbed, and the secretions altered and painful in disorganisation, painless in neuralgia. 3. The sympathetic affections; these are characteristic of hyperæsthesia, while they are absent in organic disease. When the latter has endured for a longer period, it is marked by the absence of the ordinary complexion and by considerable emaciation.

In treating this affection we must pay particular attention to the causes to which it may be attributed. After they have been removed and the complications disposed of, the following remedies may be looked upon as particularly serviceable. In the first place, sea-bathing should be repeatedly tried; next in order, stands steel in the shape of chalybeates, the waters of Spa or Pyrmont, natural or artificial, which may even be taken during the winter months, in doses of from one to two wine-glassfuls, or of the various preparations of the pharmacopœia; among these, Abercrombie prefers the sulphate of iron, in doses of from one to two grains made up with extract of aloes. We can also recommend the exhibition of bismuth:—

℞. Bismuth. Trisnit., gr. j—ij;
Hyoscy. Extr., gr. j;
Magn. Carb.,
Sacch. alb., āā, gr. v. Fiat pulvis, bis vel ter die sumend.;

the nitrate of silver at a quarter of a grain pro dosi, nux vomica at from 8 to 10 drops of the tincture, or 1 to 3 grains of the powder, belladonna, the root or the extract, the latter dissolved in aqua laurocerasi—

℞. Extr. Belladonn., gr. iv;
Aquæ Laurocer., ʒij. M. bis vel ter die gutt. xvj, sumend.;

and valerian, especially in the form of infusion with the menyanthes trifoliata. As a palliative chamomile proves serviceable either as an infusion or its ethereal oil—

℞. Ol. Chamom. Ether., fƟss;
Sp. Eth. Sulph., ʒij. M. alterna quaque hora gutt. xv, sumend.;

and carminatives, and in very obstinate cases, opium. The treatment may be aided by external applications, such as the emplastrum belladonnæ, the emplastrum galbani, friction with the following liniment—

℞. Mixt. Oleo-balsamic.,[1] ℥j;
Tinct. Opii, ʒij. M. fiat liniment.;

with a few drops of oleum sinapis, and by enemata of assafœtida. The diet should be carefully regulated. Wet feet, and constipation, to which the patients are very liable, are to be avoided. Saline purgatives should, however, be avoided, as they are apt to excite the neuralgic attack. Cold beverages and ice are injurious, as well as fat, cured meat, and watery fruit.

BULIMIA, POLYDIPSIA.

The varieties of hyperæsthesia of the vagus just treated of do not differ from those of the cutaneous nerves; the specific manifestations of the nerve, however, differ essentially both in their hygienic and their morbid phenomena from the tactile sensations of the skin. We now allude to the sensations connected with the functions of nutrition and respiration.

The sense of *hunger* and *satiety* is propagated along the

[1] [Mistura oleoso-balsamica sive balsamus vitæ Hofmanni is an aromatic tincture made from lavender, cloves, cinnamon, rue, orange, mace, marjoram, lemon-peel, and balsam of Peru.—Ed.]

fibres of the gastric distribution of the vagus, and more particularly by fibres having their peripheral termination in the stomach. The experiment of dividing the vagus in animals contributes to elucidate this point; and although scepticism may reject one result, the loss of appetite after the operation, it cannot do so with regard to the other, which proves the loss of the sense of satiety. Animals subjected to the operation have been observed by Le Gallois, Brachet, and Arnold, to continue eating until their stomach and pharynx were distended to an enormous size, and the food actually gushed from the mouth from over repletion. Similar voraciousness has been met with in man, and has been mistaken for hunger, whereas it is a proof of anæsthesia. In hyperæsthesia the sense of satiety does not cease, though it may present itself in an abnormal relation to the appetite. Thus both sensations may be exalted; it not unfrequently happens that where there is a voracious appetite, a sense of repletion follows upon the consumption of a trifling quantity of food. In other cases satiety follows later. Voracious appetite—bulimia, cynorexia—is generally associated with other sensations; such as one of burning or gnawing at the pit of the stomach, of overpowering debility, resembling syncope. The psychical relations of the sense of hunger are altered; there is no appetite, and taking food affords no enjoyment. At times vomiting and diarrhœa supervene.

This species of hyperæsthesia rarely occurs in an isolated or idiopathic form; it is generally associated with other morbid states, and is then only a sympathetic phenomenon; thus we meet with it during the period of convalescence, in pregnancy, in agues, hysteria, and insanity, in ergotism, helminthiasis, diabetes, and it also presents itself, like other hyperæsthetic conditions, as the precursor of various maladies, as for instance, of gout. Prognosis and treatment must vary accordingly. In obstinate cases we may expect some benefit from keeping up a prolonged state of nausea.

Besides hunger, we find the sensation of thirst connected with the function of nutrition, and though the vagus cannot with certainty be proved to be the conductor of this sensation, it may be affirmed to be so with some probability; Valentin[1]

[1] De functionibus nervorum cerebralium et nervi sympathici libri quatuor; Bernæ, 1839, p. 78, § 100.

ascribes the function to the sensitive branches distributed to the pharynx. Larrey[1] states, that he has observed injuries of the œsophagus and the vagus nerve to be accompanied by very violent thirst; a peculiar disease of the stomach, gastromalacia, is characterised by the most intense thirst. Hyperæsthesia of the sensation of thirst, *polydipsia,* has been occasionally observed as a primary affection; the patient longs especially for cold beverages, and is tortured day and night by the desire for drink. He does not generally suffer from hunger; at times there is even a distaste for food. The renal secretion corresponds in amount to the quantity of beverage consumed, and excepting the necessary dilution, it does not differ from the normal constitution of urine. The tongue and pharynx are generally dry and red, and the saliva is sparingly secreted.[2] Early life, from the third year to puberty, is most predisposed to the affection. The causes that give rise to it are obscure. Jos. Frank mentions a boy of twelve years of age, who was a patient in the Willna hospital, and suffered from unquenchable thirst; he drank as much as twenty quarts of liquid in four and twenty hours, and complained, at the same time, of a pain at the epigastrium, which had supervened suddenly with the thirst, when he was one day attempting to extricate his cart that had stuck in the mud. The prognosis of this hyperæsthesia is not favorable. J. Frank[3] lauds the sal prunellæ (nitrate of potash) as a specific, in the following form:

℞. Salis Prunell., ʒj;
Aquæ Font., Oj;
Syr. Rubi idæi, ʒj. S. Alternis horis ʒj—ʒij, sumendæ.

This salt must be used with care, for in one case death has resulted from a large dose of a table-spoonful. Brodie[4] relates a case of intermittent polydipsia occurring in daily paroxysms, which yielded to quinine.

Polydipsia is more frequently associated with other diseases, as diabetes mellitus, and diuresis connected with an abnormal relation of the urea, with the cold stage of ague, and the loss

[1] Clinique Chirurgicale, vol. ii, p. 155.
[2] An interesting case is given by Dr. Martini in Rust's Magaz., 1827, p. 149.
[3] Jos. Frank; Prax. Medic. Univ. Præcepta, vol. i, p. 299—313; Lips., 1835.
[4] Lectures illustrative of certain Nervous Affections, p. 30.

of serous fluid, as occurs in the most palpable manner in Asiatic cholera. Baglivi[1] has drawn attention to the fact, that the employment of blisters is accompanied by intense thirst.

As the sensations upon which the function of nutrition depends are conducted by the gastric distribution of the vagus nerve, the wants of the economy, as regards the aeration of the blood, are conveyed to our consciousness by the distribution of the same nerve to the organs of respiration. This specific action of the branches of the vagus is excited not only by external irritation in the lungs, but also by subjective impressions, and by circumstances by which the irritability of the nerve itself is exalted. I shall have occasion to dilate upon an hyperæsthesia of this kind, occurring during sleep, and known as *nightmare*, or *incubus*, when we come to the consideration of *hypnoneuroses*.

[1] Dissertatio de usu et abusu vesicantium, cap. ii, § 1.

CHAPTER XI.

HYPERÆSTHESIÆ OF THE NERVES OF THE ORGANS OF SENSE.

HYPERÆSTHESIÆ SENSUALES.

The great progress made by modern physiology, in representing the sensible qualities of material objects as expressions of the activity of the senses, which may be manifested independently of external irritation, in consequence of an altered condition of the nerves, has borne much fruit in the field of pathology. Hitherto hyperæsthesiæ of the nerves of sense had been classed with hallucinations; they will now occupy their proper place in nosology, and take their position among the hyperæsthesiæ of other nerves. Nor is it less important, either with regard to nosology or etiology, to have ascertained that the same influence excites in each nerve of sense only that special impression of which it is capable; in the optic nerve it produces the sensation of light; in the acoustic, that of sound; and so on with the others. It is also of consequence to remember the fact demonstrated by Henle, in his valuable *Pathologische Untersuchungen*,[1] that the irritation does not induce the sensual phenomenon, but merely strengthens or modifies it, and that the nerve of sense retains its activity, which periodically rises and falls, without any other impulse than that which the vital reaction of the economy exerts.

The older pathologists took a limited view of the relation of the hyperæsthesiæ of the senses to consciousness; it is of sufficient consequence to demand a distinct notice here. The part which the sensorium takes in the action of the nerves of sense in the normal condition, and which renders it so difficult to determine what belongs to the mere impression upon the senses, and what to the imagination, acquires an overpowering influence in the hyperæsthesiæ. To this must be

[1] Page 214.

added the influence exerted by attention, which not only fixes the phenomenon, but is able to heighten the force of the impression.

It is extremely difficult to ascertain precisely whether the affection has its seat in the central or peripheral parts of the nervous system; except in that case in which the peripheral distribution has become incapable of conduction, and the sensual impressions can only be excited at the cerebral terminations of the nerves. Our knowledge on this point is most advanced in regard to the optic nerve.

HYPERÆSTHESIA OF THE OPTIC NERVE.

The characteristic of optical hyperæsthesia consists in the production of luminous and chromatic sensations, dependent upon increased sensibility of the optic nerve.

This condition excludes every sensual impression upon the organ of sight, which is excited by external influences, whether by a normal stimulus of the optic nerve, as light, or by some other agent, such as pressure, a blow, galvanism, and the like. The sensation of light in these cases stands in a definite relation to the duration and intensity of the objective stimulus, and even the after operations of the visual impressions, the secondary images, diminish from the first instant, and do not return, when they have once disappeared, whilst the luminous phenomena of hyperæsthesia keep pace with the increase of irritability, both as to duration and intensity. The forms under which these phenomena occur are various, like those determined by luminous rays. They may present sharp and defined limits and boundaries, or they may be confused and indistinct.

Both older and recent nosologists have attempted to apply a nomenclature to them. Sauvages[1] speaks of suffusio scintillans, radians, suffusio Danaes. Modern authors distinguish between photopsia, luminous phantasmata, and chromopsia, or coloured phenomena. It is important, in reference to a diagnosis between central and peripheral disease, to ascertain the shape, and especially the sharpness of the contour. If the

[1] Nosol. Meth. ed. Daniel, vol. iv, p. 268.

retina be the part affected, the images present a sharp outline, which may be so marked that as the retina in this condition is sensible of itself, the patient may perceive parts of it, or its blood-vessels, or even the movement of the blood corpuscles.[1] The patients themselves see the phenomenon with such precision that they attempt to give a delineation of it. Ruete, who has laboured successfully to establish the physiological relations of ophthalmic disease, has described such luminous phenomena as originating in the circumference of the optic nerve, and invariably commencing externally to the optic axis, in the direction corresponding to the optic nerve. They generally have a semilunar form; they are less frequently circular, with an asteroid border and a silvery, golden, or coloured margin. The rays are in a constant state of intense cilia-like movements, appearing most frequently in the right eye, less frequently in the left, and least of all, on both eyes at once; they follow the movements of the eye, and as the organ adapts itself to nearer or more remote objects, they increase in apparent size and intensity. If the distance of the object remains the same, they retain the same size only for a short time; they then begin to extend and to move to one side, and almost backwards; at last the fire seems to dart from the forehead, the temple and the zygoma, if the cause of irritation resides in the vicinity of the ciliary portion of the retina, as the lines of vision of this part pass through the localities alluded to. As the lines of vision approach the ciliary portion, the phenomenon ceases, because the nervous fibres terminate here. Its duration varies from several minutes to several hours, and it may return after weeks, months, and even years. The phenomenon remains luminous, whether the eye is open or closed, except that it is rather more vivid and distinct in the latter case. Vision is not impaired; even during the persistence of the phantasmata, objects that are not covered by the rays appear distinct and well-marked; but those that interfere with them become indistinct, and look as if surrounded by a halo. Violent headache generally ensues,

[1] Purkinje; Beiträge zur Kenntniss des Lebens in subjectiver Hinsicht.—Müller's Physiology, Dr. Baly's translation, vol. ii, p. 1162.—Valentin; de Function Nerv. Cereb. et Nervi Sympathici, p. 15, § 31, art. 6.

accompanied by a sense of tension and weight in the eye.[1] If the central organ of the optic nerve is the seat of the affection, the luminous pictures are less defined; they resemble the images of dreams, are removed from the circle of human or animal forms, and, from the field of vision presenting no depth, appear disposed upon a flat surface.

It is important to attend to the relations existing between optical hyperæsthesia and the visual impressions made by objective stimuli and consciousness. The phantasms are perceived while the eyes are open and while they are closed, as well as in the case when the rays of light are precluded from acting upon the retina; of this the following case is an instance:

Mrs. G—, a widow of eighty-five years of age, and of a robust constitution, was affected, eight years previous to her death, with cataract of both eyes; she underwent an operation, which appeared at first to prove successful; after a few months, however, her sight became impaired, the left bulb became atrophied, the right pupil closed, and the patient was now only able to distinguish light from darkness. At this time she first began to complain of seeing long rows of worms, long strips of coloured linen, or long threads of worsted, constantly passing upwards. An artificial pupil was now made in the right eye. The phantasms ceased for a time, but returned after eight weeks, first assuming the old shapes, and subsequently new ones. High walls rose up before her, heavily laden carts surrounded her, or human figures hovered about her, generally threatening and alarming, rarely with a friendly aspect. These phenomena generally occurred only during the waking state; they soon became so vivid, that the patient felt convinced of their real existence, and though continuing in the full possession of her intellectual faculties, made defensive movements with her hands whilst conversing. Her forehead was hot, the face much flushed, the pulse fat and hard, and there was a sense of anxiety and oppression, which, with the other symptoms, became aggravated towards night. The phantasms continued, with occasional remissions and exacerbations, during six years, until death ensued. Fits of vertigo and unconsciousness supervened, associated with weakness, and subsequently with paralysis of

[1] Ruete; Lehrbuch der Ophthalmologie, 1845, p. 71.

the left arm; these recurred several times during the year, without exerting any influence upon the visual phenomena. In the month of January, 1837, the patient was seized with a more violent apoplectic attack, the symptoms of which were deep coma, continuing for four and twenty hours, stertorous breathing, slow full pulse, paralysis of the left arm and leg, and involuntary discharge of urine and fæces. She recovered also from this attack, and lived for a year and three months later without further inconvenience. On the 16th of March, 1838, after feeling particularly well and happy during the previous day, she was seized, during the night, with a fresh apoplectic attack, accompanied by complete apoplexy of the right side; she died in the evening of the following day. In the right hemisphere of the cerebrum, not far from the external edge of the posterior lobe and the surface, we discovered a cavity of the size of a plum, invested with a reddish membrane, and containing a small quantity of ochry fluid: I still retain the preparation. There was fresh extravasation of blood in the middle and posterior lobe of the left hemisphere, near the corpus striatum and the thalamus opticus. The latter was converted into a greyish red pulp. The optic nerves and the chiasma were normal. An examination of the retina was not permitted.

Even when disorganisation and atrophy of the peripheral termination of the optic nerve has occurred, hyperæsthesia may present itself with great intensity as a centric affection. A case of this kind has been described by Dr. Johnson.[1] It occurred in a distinguished artist, who had for several years suffered from photopsia, to which afterwards headache and diminution of vision were added, terminating in complete blindness. Nevertheless the luminous phenomena continued night and day, and occasionally assumed the appearance of angels with flaming swords, whose movements were apparently accompanied by an electric light. The forms, however, frequently varied. The mental powers of the individual remained unimpaired, and whenever he went out he was very attentive to everything that did not require eyesight. In the spring of 1835, he had an apoplectic seizure, which deprived him of movement, consciousness, and speech. Urine and fæces were voided unconsciously, and the pupils were enlarged. He recovered from this condi-

[1] Medico-Chirurgical Review, 1836, No. 37.

tion, and after a few weeks he was again able to go about the town and attend to his business. But the visual phenomena returned, and were painfully dazzling, and almost more continuous than before. In the month of August, the apoplectic attack returned, and death ensued in three days. The right lateral ventricle of the brain contained nearly three ounces of clear fluid. The left was full of bladders resembling hydatids, of various sizes, and containing fluids varying in consistency. This botryoidal accumulation sprung from the floor of the ventricle by a kind of pedicle, and penetrated into all the recesses of the cavity, pushing its branches forwards, so as to extend beyond the thalamus of this side into the opposite half of the brain, destroying everything that opposed its passage. Both thalami optici were converted into a pulp as well as the whole anterior lobe, which was so diffluent as scarcely to bear the slightest pressure. The optic nerves were compressed by the hydatids, so as to present a mere thready appearance. Optical hyperæsthesia bears a close relation to the mind. The affection of no other nerve of sense produces so powerful a conviction of the reality of its phantasms: there is none that so easily causes an alienation of individuality during the phenomena, and by this means insanity.

The *causes* influence either the peripheral or the central distribution of the optic nerve. Among the former are overstimulation of the retina by intense light, (Purkinje's blendungsbilder, dazzling images,) or by long-continued microscopic investigations.[1] Thus Henle[2] relates, that while examining for several days continuously in summer, the ciliary movements of branchiobdella, the tremulous striæ reappeared in the evening among the confused threads passing before the quiescent eye, luminous and well-defined, and with the same wavy movement shown by the microscope. Among the causes we have also to mention congestion of the *retina,* with which it appears that a definite form of the phantasms, and the influence of respiration, are connected. We find it mentioned by Sauvages, in the work already quoted, that in reticular suffusion, the retina becomes dark during inspiration, and is cleared up during

[1] Valentin, loc. cit.

[2] Ueber das Gedächtniss in den Sinnen, Wochenschr. für die ges. Heilkunde, 1838, p. 203.

respiration; Müller[1] observed that if he closed his eyes, and for a length of time watched the darkness, a light frequently became diffused from a certain point rhythmically over the field of vision, which was synchronous with respiration and after a time disappeared. The luminous spectra attain the highest degree in inflammation of the retina. The causes may act directly or indirectly upon the central structure of the optic nerve. Thus optical hyperæsthesia is a frequent accompaniment of cerebral disease, as insanity, (according to Esquirol,[2] in eighty cases out of a hundred,) delirium tremens, vertigo, hypochondriasis, and ecstasis. So called magnetic and religious visions have attained a melancholy notoriety by the deceptions and lies with which physiological facts have been enveloped. Affections of the mind, and especially fear and terror, narcotics, particularly opium and digitalis, and other substances that enter the blood, operate in a like manner. Thus, in his experiments with laughing gas, which is a powerful agent in causing ocular spectra, Unzer saw a variety of luminous forms, fiery points, animals, and the like; and Sir Humphrey Davy[3] narrates his personal experience with the protoxide of nitrogen, in the following words: "During the time that I frequently inhaled the gas, I slept much less than usually, and before going to sleep my imagination was long occupied with numerous visionary images. In proportion as the agreeable sensation increased, all connection between my conceptions and external objects ceased. Trains of vivid spectra passed rapidly before my mind's eye."

Optical phantasms are caused by congestion or the withdrawal of blood from the brain; thus syncope invariably commences with optic hyperæsthesia. We must not forget the influence of obstructed sanguineous discharges, as an instance of which, we remind the reader of the effect of an omitted venesection in the well-known case of Mr. Nicolai.[4] Debi-

[1] Ueber die Phantastischen Gesichtserscheinungen; Coblenz, 1826, p. 15.

[2] Des Maladies Mentales, vol. i, p. 199.

[3] Reil's Fieberlehre, vol. iv, p. 285.

[4] [The Mr. Nicolai referred to is the person to whom Goethe alludes in Faust, where Mephistopheles, addressing the Proktophantasmist, says:

"Er wird sich gleich in eine Pfütze setzen
Das ist die Art wie er sich soulagirt,
Und wenn Blutegeln sich an seinem Steiss ergetzen
Ist er von Geistern und von Geist curirt."—Ed.]

litating discharges, especially seminal emissions, morbid conditions of other organs, particularly of the heart and of the digestive organs, are frequent causes. Nor may we omit atmospheric influences, an interesting instance of which is given by Professor Zeune,[1] who states, that in two of his blind pupils ocular spectra are indicative of atmospheric changes. In fine weather they enjoy pleasing visions, while they see confused images in dull weather.

Optical hyperæsthesia generally runs a chronic course; it threatens danger both to the eye and the brain; not unfrequently coloured and luminous vision precedes amaurotic blindness. The influence exerted upon the mind by the affection is manifested even in peripheral hyperæsthesia of the optic nerve. With the exception of hæmoptysis there is, probably, no disease which, from its first commencement, makes so deep an impression, depriving the patient of resolution and self-command, and frequently laying the foundation to enduring hypochondriasis. In central hyperæsthesia the reaction is less rapid, but, as I have already had occasion to state, it is more overwhelming.

In our treatment we must, therefore, have regard to the regulation of the mind. We must attempt to divert the attention of the patient, though the most persevering efforts to do so frequently fail of success;—the various means at our command will be examined in the chapter on hypochondriasis. The effect of alterative and nauseating remedies in inveterate cases has met with more laudation than is warranted by experience. They are occasionally effective in recent attacks; thus their exhibition was followed by good results in the case of a young man of four and twenty, whose health had previously been excellent, but who had suffered much from the influence of an unhappy attachment. Six weeks before consulting me he accompanied a friend to his apartments, and, accidentally in the dark, took up something that was lying on the table, and which he recognised, when the object was suddenly illuminated, as a human skull. From this moment he suffered from spectra in the right eye; a shapeless, luminous object appeared to approach him on one side, and gradually assumed the form of a disc, brilliant with all the colours,

[1] Belisar., p. 25.

which was turned round with extreme velocity before the right eye. This phantasm caused the patient such extreme anxiety, that when his attacks came on he was violently agitated; it occurred chiefly at night, and he would then take refuge with his mother or sister, and cling to them, and at last throw himself despairingly and in tears upon his bed. By attacking the nerves of the stomach antagonistically by emetics, and following them up by purgation, a cure was effected in ten days. In other cases the employment of suitable warm mineral baths and travelling may prove beneficial. I have met with several individuals who, perhaps, were not entirely relieved from their spectra by these remedies, but who were enabled to raise themselves above their influence on the mind. It is almost superfluous to suggest the necessity of attending to the part played by the blood in hyperæsthesia whether the disease occupy a peripheral or a central seat. Constipation must be counteracted and all local irritants avoided.

ACOUSTIC HYPERÆSTHESIA.

Acoustic hyperæsthesia is characterised by a sensation of sound and musical notes dependent upon increased irritability of the acoustic nerve.

It is easy to ascertain the cause of a sound arising externally to the organ of hearing by concussion of the atmospheric waves; but it is difficult, and often impossible, to determine whether the acoustic sensation is owing to increased irritability of the nerve or to a sound produced in the interior of the ear. The remissions and variety of the sounds have been stated to serve as a criterion, but the rushing sound produced by condensation of the air in the tympanum, and tension of the membrana tympani, comes and goes, and may alternate with noises of a different character. We can only assume the seat of the affection to be in the nervous structures with certainty, when deafness coexists.

The sounds perceived differ very much, from simple tinnitus aurium to melodious chants; or they may resemble the human voice or the cries of animals. It is useless to designate these varieties by separate names, and the nomenclature hitherto adopted, (susurrus, sibilus, tinnitus, bombus, &c.,) has no

other value than that it indicates the difference between a mere noise and a definite tone.

The sensations of sound occur whether the ears be closed or open, in quiet retirement or noisy society; they are not unfrequently so intense that the impression of the atmospheric waves upon the acoustic nerve is weakened, and even obliterated; this is particularly the case in tinnitus aurium, which most patients look upon as the sole cause of their deafness.

In a review of my remarks on this subject in the first edition of the present work, Kramer has shown the difficulty of diagnosing the tinnitus aurium depending upon acoustic hyperæsthesia, as it accompanies most affections of the ear, whether of the meatus, the tympanum, or the Eustachian tube; any attempt to determine whether the peripheral or central portion of the nerve were affected would, therefore, be vain and rash. We are, consequently, merely able to form a conjecture as to whether affection of both acoustic nerves, cophosis (deafness), vertigo, a complication with optical spectra, and marked sympathy of the cerebrum, indicate central hyperæsthesia.

The causes of the malady affect either the peripheral distribution of the nerve or the brain. Violent explosions and continued loud noises must be reckoned among the former. This variety of hyperæsthesia is frequently the forerunner and associate of diseases of the brain; it precedes apoplectic and epileptic fits, generally follows upon vertigo, and frequently accompanies insanity. Esquirol[1] mentions two mad women, who, though completely deaf, constantly heard voices of human beings with whom they quarrelled until they wound themselves up to the most violent rage. The vascular system exerts an undoubted influence upon this hyperæsthetic condition. It is a common thing to hear patients affected with hypertrophy of the left ventricle complain of rushing and roaring, not only in the ears, but, as they express themselves, in the entire head. Tinnitus aurium is rarely absent in menorrhagia and other hæmorrhages, and syncope is ushered in by this symptom; hæmorrhoids, too, and the associated derangements of digestion, are often accompanied by acoustic phantasms. I have frequently

[1] Des Maladies Mentales, vol. i, p. 196.

met with tinnitus aurium as a consequence of the employment of sulphate of quinine.

As regards the *prognosis* of the affection, its relation to hardness of hearing and deafness is of most importance. Itard[1] states that deafness which results from tinnitus aurium is characterised, at least at its commencement, by not preventing the perception of isolated sounds, but that it is merely an impediment to the intelligence of speech, and of a multitude of consonant sounds, as in general conversation, or in singing with a musical accompaniment. He also recommends an experiment which, if successful, is said to remove all doubt; this consists in compressing both carotids for a few minutes. The tinnitus then generally ceases; if the deafness disappears at the same time, it must be looked upon as a consequence of the former, or as the result of the same causes. The effect of the experiment is, however, denied by Kramer.[2]

Before proceeding to the treatment of these illusory noises, it is absolutely necessary that an examination of the accessible portions of the auditory apparatus should be made by an experienced hand. The assumption of a congestive state, against which general and local abstraction of blood is employed, frequently meets with a reductio ad absurdum in the discovery—even by the patent's nonmedical friends—of an accumulation of ear-wax.

We are most likely to obtain a cure when the affection originates in hæmorrhages or exhaustion; we shall succeed less if it rests upon an hypochondriac foundation. Among the local remedies we may expect some benefit, though only of a palliative character, from the introduction into the Eustachian tube of the vapour of ether. In obstinate cases, when the illusory noises disturb or prevent sleep, Itard[3] recommends that the apparent sounds be counteracted by producing a similar uniform real noise. Thus the annoyance of the dull humming in the ear, that resembles the distant roar of the wind or the rustling of a stream, may be relieved by the crackling of a brisk fire. In one patient, residence in a water-mill produced a most satisfactory result.

[1] Die Krankheiten des Ohrs und des Gehörs.; Weimar, 1822, p. 181.

[2] Loc. cit., p. 537.

[3] Loc. cit., p. 189.

We must distinguish *otic neuralgia* from acoustic hyperæsthesia; it is seated in the filaments of the fifth pair supplying the tympanum and the internal meatus, and gives rise to painful hearing in the same way as ciliary neuralgia causes photophobia.

OLFACTORY HYPERÆSTHESIA.

It is as difficult to determine whether the perception of smells is independent of external stimuli, as it is in regard to the sense of sound. For the olfactory nerve may be roused to activity not only by the air that rushes in from without, but also by that passing out from within, as demonstrated by the smells developed in the organs of respiration and digestion; it is even doubtful whether an odour may not be developed from the blood by means of the circulation.[1]

The cases that have been hitherto published are instances of central affection. In a man, who had constantly complained of an unpleasant odour, Manegault found incrustations scattered over the arachnoid and purulent deposits in the hemispheres of the brain.[2] Dubois[3] was acquainted with a man, who, after a fall from his horse, which occurred several years before his death, imagined that he smelt a stench. Illusory odours occur in insanity, though less frequently than optical or acoustic illusions. Esquirol[4] relates the case of an insane female, who constantly perceived the smell of copper, and of another, who, during the last stage of phthisis, was affected with an odour of carbonic acid gas. In hysteria we most frequently meet with olfactory hyperæsthesia, as well as in affections of the intestines, the uterus, and the genitals.[5]

The sensation of odours occurring in anosmia, of which Bérard[6] gives a case, must be looked upon as a centric affection.

[1] Dupuytren observed, that on injecting an odorous fluid into the veins of a dog, the animal distended its nares, raised its head, and snuffled, as if it were seeking a scent externally. (H. Cloquet; in Dictionn. des Sciences Méd., vol. xxxvii, p. 245.)

[2] Froriep's Notizen, vol. viii, p. 256.

[3] Müller's Physiology, Dr. Baly's edit., vol. ii, p. 1318.

[4] Des Maladies Mentales, vol. i, p. 7.

[5] Hipp. Cloquet; Osphrésiologie ou traité des odeurs, du sens et des organes d'olfaction; Paris, 1821, p. 749.

[6] Froriep's Notizen, vol. xi, p. 151.

In that instance, the olfactory nerves were found destroyed, but nevertheless the patient had complained of disagreeable smells.

The observations that have been hitherto published, do not show whether the sense of taste is as much implicated in olfactory hyperæsthesia as it generally is in the sense of smell. A patient, who consulted me some time since, complained of a constant smell of smoke like creosote, which interfered with all his meals. It may be surmised that nausea occurs sympathetically, and vomiting as the result of reflex action in this affection, but we have no definite observations to that effect.

GUSTATORY HYPERÆSTHESIA.

We know least of the affection dependent upon increased irritability of the nerves of taste. Doubts naturally suggest themselves as to the presence of external irritants in the mouth and the mucus of the tongue; while, on the other hand, we know of no instances of gustatory anæsthesia, in which the conducting power of the nerve being destroyed, gustatory perceptions of centric origin occurred. Still the analogy of other sensual illusions scarcely allows certain perceptions of taste occurring in hysteria, hypochondriasis, or insanity, to be differently interpreted.

The tactile nerve of the tongue is more frequently affected by hyperæsthesia than the nerve of taste, and this is manifested by neuralgia, and in the shape of pruritus and ardor.

CHAPTER XII.

HYPERÆSTHESIA OF THE SYMPATHETIC TRACTS.

In our researches into the morbid conditions of the sympathetic nerve, it is as necessary to exercise a severe critical acumen, as with regard to the pathology of the nervous system generally; it is the only way to avoid the dangers of mystification on the one hand, or of a scepticism which is unfavorable to progress, on the other. This also holds good with reference to the sensibility of the sympathetic; this point was not long since invested by some in a phantastic dress, or it was utterly repudiated by others; it has now been established upon an anatomical and physiological basis. Although the researches of Volkmann and Bidder have demonstrated a distinct class of nervous fibres as peculiar to the sympathetic system, the sensory character of which is certainly disputed by Volkmann, we treat of the sympathetic in connection with hyperæsthesia, as a mixed nerve, containing sensory filaments of the cerebro-spinal system. It is for this reason that I have given the preference to the term sympathetic tracts (sympathische nervenbahnen). The living animal is seen to be sensible of mechanical and chemical irritation by the manifestation of pain, which appears to differ in intensity according to the seat of the irritation. Thus irritation of the communicating branch produces exactly the same results as irritation applied to any other spinal nerve of sensation, while it is requisite to apply violent irritation to the abdominal ganglia before the animal utters a cry of pain. We must bear in mind, however, that the animal is unable to inform us whether it experiences any other sensation besides that of pain, for we are unable to apply to its sensations any standard but that available for irritation of a cutaneous nerve. Man describes it in definite terms, as in those simple cases of external injury which may be compared to experiments on living animals; when we listen to his complaints after a blow upon the pit of the stomach, or upon the testicles, he

dwells upon the overpowering sense of prostration, as if the root of life were threatened; this is the symptom which is more or less manifested in every case of hyperæsthesia of the sympathetic, either by itself or associated with pain; the pain itself differs neither in degree nor in character (whether tearing, stabbing, or aching), from that arising in a cerebro-spinal cutaneous nerve; nothing but ignorance could induce a doubt of this fact.

There are a few other peculiarities appertaining to hyperæsthesia of the sympathetic, which depend upon its physiological destination. In the first place, we allude to the excitement of reflex action in the muscles both of the voluntary and involuntary class. In health, the impressions made upon the sensitive fibres of the sympathetic are rarely reduced to consciousness, but at once give rise to reflex actions; in hyperæsthesia, however, a conduction in both directions takes place, and thus not only a perception of the sensation results, but we also find that the muscular fibres contract, whether in the heart, the intestinal canal, the ducts of the glands, or the abdominal muscles. Besides the reflex action, we also find the activity of the nerves presiding over nutrition more excited in this affection than in hyperæsthesia of the cerebro-spinal system. The so-called vegetative functions (secretion, and, in part even, the circulation,) are deranged.

After premising these general remarks, we shall now proceed to examine the hyperæsthetic states of the individual plexuses of the sympathetic.

HYPERÆSTHESIA OF THE CARDIAC PLEXUS.

(*Angina Pectoris.*)

The patient attacked with angina pectoris is suddenly seized with a pain under the sternum in the neighbourhood of the heart, accompanied by a sense of anxiety so intense as to induce a belief in the approach of death. The beat of the heart and the pulse are weak, small, irregular, and intermittent; respiration is generally laboured and oppressed, though at times unaffected, the temperature of the hands and face is cool, the complexion pale, and the features sunken. Sympathetic pains supervene, varying in seat and intensity; the

pain most commonly is felt down the left arm, not so often in the right, and very rarely in both at once: it passes down to the insertion of the deltoid muscles, or to the elbow-joint, or along the ulnar nerve to the tips of the fingers; or, again, there may be a pricking sensation, as that felt when the extremities go to sleep. The pain often extends over the neck to the anterior surface of the breast, or by the subcutaneous nerves of the upper cervical nerves, up to the edge of the jaw, and an affection of the vagus presents itself in the shape of globus hystericus. When a paroxysm of this description has lasted from a few minutes to a quarter or half an hour, it generally passes off gradually, with eructations, or it may, though less frequently, cease suddenly, and the health then remains unimpaired, until after a longer or shorter interval the attack is renewed.

This description applies to uncomplicated angina; when it is associated with disease of the heart and large vessels, it presents different characters. We then find that the intervals are not marked by a perfect freedom from disease, and that the paroxysm itself is characterised by the additional symptoms of heart disease. The greater and more rapid the progress of the latter, the more the neuralgic attacks recede, and even disappear.

The seat of the sympathetic sensations is a matter of physiological interest, inasmuch as it indicates the focus of the sensitive fibres of the cardiac plexus. Müller[1] was one of the first to point out that the principal cord of the sympathetic is only apparently continuous from the upper cervical to the coccygean ganglion, and that the fibres derived from the spinal cord, after entering the cord of the sympathetic, continue in it for a certain distance, and then pass off to their peripheral distribution in the intestines. It follows that sympathetic filaments, proceeding from the principal cords, are in close proximity to cerebro-spinal nerves, which have their distribution higher up in the trunk, and that if sensation is radiated from any of the thoracic or abdominal viscera, the pain is felt at the upper extremities, in the neck, or even higher still, in the head.[2] Thus we may, from the sympathetic sensations

[1] Handbook of Physiology, Dr. Baly's ed., vol. i, p. 666.

[2] See Henle; Pathologische Untersuchungen, p. 110.

occurring in cardiac neuralgia, conclude that the sensory fibres of the sympathetic are anatomically contiguous to the sensory elements of the cervical nerves; nor is it surprising that a similar series of symptoms is produced when the cervical portion of the spinal cord is primarily affected. This is a point which has been entirely overlooked by those observers who, treading in the footsteps of Parry and Jenner, taught that cardiac neuralgia, or, as it was first called by Heberden, angina pectoris, was due solely to a peripheral cause; they looked upon a definite organic change, such as ossification to the coronary arteries, as the essential constituent of the disease. Others have been willing to admit that cardiac neuralgia may be attributed to various other morbid affections of the heart, but, as modern research has satisfactorily demonstrated, erroneously; we cannot do better than to refer those who are of a different opinion, to the experience of Laennec[1] for instruction.

Infancy is entirely exempt from this variety of neuralgia; it rarely occurs in youth, while the middle and advanced periods of life are the most fertile soil for its growth. Arthritis and hysteria are the chief predisposing causes. Violent exercise

[1] Laennec; Traité de l'Auscultation Médiate et des Maladies des Poumons et du Cœur, 4 ed., augmentée par Andral; Paris, 1837, vol. iii, p. 495. "La plupart des médecins n'en sont pas moins restés persuadés en Angleterre, en Allemagne, et en Italie surtout, que l'angine de poitrine est toujours liée à quelque maladie organique du cœur, que cet accident est très grave et que la plupart des malades qui en sont attaqués meurent subitement. Ces idées sont loin d'être exactes. L'angine de poitrine à un léger, ou à un médiocre degré, est une affection extrèmement commune, et existe fort souvent chez des sujets, qui n'ont aucune affection organique du cœur ou des gros vaisseaux. J'ai vu beaucoup de personnes, qui en ont éprouvé seulement quelques attaques très fortes, mais de courte durée et qui en ont été ensuite débarassés. Je crois même que l'influence de la constitution médicale contribue à son développement, car je l'ai observé frequemment dans les cours de certaines années et je l'ai à peine rencontré dans les autres. D'un autre coté il est vrai que l'angine de poitrine coincide assez souvent avec des affections organiques du cœur, mais rien ne prouve qu'elle en depende même dans ces cas, puisqu'elle peut exister sans cela et que ces affections sont variables. J'ai ouvert plusieurs sujets attaqués à la fois d'hypertrophie ou de dilatation de cœur et d'angine pectoris, chez aucunes je n'ai trouvé les artères coronaires ossifiées. Un seul d'entr'eux mourût subitement en milieu d'une violente attaque d'angine de poitrine; et l'on concoit que la réunion d'une affection nerveuse aussi intense à une énorme hypertrophie du cœur (qui existait chez ce sujet) puisse quelquefois produire cet effet."

especially after a full meal, ascending stairs or mountains, affections of the mind, and errors in diet, act as exciting causes.

In forming our *prognosis* we must not be led astray by the erroneous assumption, that organic affections of the heart are necessarily associated with cardiac neuralgia. When it occurs in an hysterical subject it loses its importance; while we are justified in feeling some anxiety when it is complicated with gout, especially of an irregular character, as this affection is apt to give rise to incrustations of the valves and the large vessels.

As regards *treatment* we must be very careful in our employment of general bloodletting, especially during the attack. In plethoric individuals, and at the commencement of the disease, cupping and leeches are preferable. If we have to deal with an arthritic constitution, issues, or a seton in the vicinity of the heart, are advisable. In hysteria we must have recourse to chalybeates and sea-bathing. Constipation should be particularly guarded against in these patients, and every kind of exertion should be interdicted; the more so, if there be a suspicion of a complication with organic lesions of the heart. Among the remedies applicable during the paroxysms, I have obtained the greatest benefit from the inhalation of sulphuric or acetic ether, a couple of teaspoonfuls of which may be poured into a saucer, which is to be held to the mouth of the patient until the ether has evaporated. Ether is also adapted for internal administration, with tincture castorei, and, in urgent cases, the addition of opium. Inunctions with the veratrine ointment in the region of the heart, and mustard poultices to the nape of the neck, must be had recourse to. Many patients find relief from raising their arms and keeping them elevated. Laennec[1] met with a case, in which palliative relief was afforded by wearing two thin curved magnetic plates at the scrobiculus cordis, and the corresponding point of the back. Their effect was increased by the application of a small blister under the anterior plate. Frank[2] relates, that he knew a patient who found the most rapid relief from the application of cold lotions to the head. A patient who was under my

[1] Loc. cit., p. 497.

[2] Praxeos medic. univ. præcepta, vol. ii, p. 251.

care, obtained more ease from eating ice during the paroxysm, than from anything else.

HYPERÆSTHESIA OF THE SOLAR PLEXUS—NEURALGIA CÆLIACA.

A violent contracting pain at the pit of the stomach supervenes suddenly, or after being preceded by a sense of oppression; it generally extends to the back, there is a sense of fainting, the face is fallen in, the hands and feet cold, and the pulse small, cramped, and intermittent. The pain attains such a pitch as to cause the patient to scream out. The region of the stomach is either swelled and distended like a ball, or, as is more frequently the case, it is drawn in, and the abdominal parietes are tense. It is common to find pulsation at the epigastrium. Pressure is not only well borne, but the patient frequently forces the pit of the stomach against some firm object, or compresses it with his hands. Sympathetic sensations occur in many instances in the thorax, under the sternum, or in the pharyngeal branches of the vagus nerve, while they are seldom met with in the superficial parts.

The fit lasts from a few minutes to half an hour; the pain then gradually ceases, leaving extreme exhaustion; or it breaks off suddenly, accompanied by eructations of gas or fluid, by vomiting, by the appearance of gentle perspirations, or copious enuresis. During the intervals, the health is generally uninterrupted.

The periodic type of the paroxysm is occasionally perfectly regular, as in the instance of intermittent fever, complicated with cardialgia, which, in fact, may be quoted as affording the most perfect picture of this species of hyperæsthesia.[1] With this exception, the disease has a chronic character.

Infancy is exempt from it; but there is no exemption as to sex, men being equally liable to the affection as females. The suppression of accustomed hæmorrhages, especially those of the uterus and hæmorrhoids, frequently gives rise to it, while, on the other hand, hæmatemesis and melæna are often preceded by neuralgia cœliaca. Gout offers a predisposition; I have myself suffered from this variety of neuralgia before my first attack of gout, and have a lively recollection of the annihilating

[1] Borsieri, instit. med. pract., vol. i, p. 235.

sensation, and the pain which resembled the digging of talons into the epigastrium. The development of carcinoma ventriculi is often preceded for years by cœliac neuralgia.

The prognosis is also dependent upon these etiological relations, and the duration of the disease. The more recent the neuralgic affection, the less complicated it is, the more likely we are to be successful; although the tendency to relapses should not be overlooked.

The symptoms are sufficiently characteristic to determine the diagnosis between cœliac neuralgia and inflammation, or disorganisation of the stomach. It is more difficult to distinguish this species from other neuralgiæ occurring in the same range, as is proved by the generic term cardialgia, which is applied to them. I am inclined to think that the peculiar sense of fainting and annihilation accompanying the pain, and which finds an expression in the vascular system, and in the general habit of the patient, is pathognomonic of cœliac neuralgia, and distinguishes it from neuralgia of the vagus.

The treatment does not differ, in any essential point, from that of gastrodynia neuralgia. It is necessary to have regard to the disturbances of the circulation and secretion, in order to obviate structural changes. Blood should be repeatedly abstracted from the part, especially by cupping; derivatives to the surface, by means of issues, may also be employed like the former, during the intervals of neuralgia. Whenever the affection presents periodicity, quinine must be exhibited boldly.

HYPERÆSTHESIA OF THE MESENTERIC PLEXUS.

There is pain, extending from the umbilicus to the abdomen in paroxysms, alternating with intervals of rest. The pain is of a tearing, cutting, or oppressing character, generally winding and pinching, and preceded and accompanied by a peculiar sense of tenderness. The patient is restless, and seeks relief by a change of position, and by compressing his abdomen; his hands, feet, and cheeks are cool; the face is tense; and the knitted eye-brows and contracted lips indicate pain. The pulse is small and hard. The abdominal parietes are tense and distended, or drawn in; nausea, vomiting, ischuria, and dysuria are

often present; and at times there is tenesmus. Constipation commonly accompanies the affection; though occasionally the bowels are open or even relaxed.

The fit lasts from a few minutes to several hours, with occasional remissions. It ceases suddenly, as if by magic, and the patient has a sense of extreme comfort. The general course of the disease has a periodical character, though the type is less regular than it is in other varieties of neuralgia.

By applying the generic term colic to every pain in the intestinal tube and the adjoining organs, the advancement of our knowledge of mesenteric neuralgia has been retarded. But one man of celebrity among the older observers, Thomas Willis,[1] has defined its meaning; we quote the following passage from his description of the passio colica: "In order to form a right conception of the seat and character of this disease, we must, above all, distinguish it from the colicky pains which go by the vulgar term,—the gripes. For these arise occasionally from solitary and accidental causes, and attack various people, and especially those of a delicate constitution, and very sensitive and excitable habits. No especial predisposition is necessary; thus incongruous and unusual beverages and articles of diet, drugs, the contraction of cold, and several other influences of a non-natural character, not unfrequently excite considerable derangement of the lower bowels with extreme pain; but this affection must not be looked upon as a disease, but merely as a symptom. But besides this, we have to deal with colic, properly so called, which not so much attacks persons promiscuously from accidental causes, but makes its appearance in some individuals who are predisposed, with peculiar features, and this entirely depends upon a causa procatarctica, which has been gradually developed. The more violent attacks of the disease generally have regular periods, and follow the changes of the weather and the season; when once excited they yield with difficulty to remedies, and do not pass off quickly; but in spite of fomentations and copious evacuations by enemata or purgatives, they persist for several days and even for weeks with great violence. The pains in every paroxysm attack the same part and are generally accompanied by the same symptoms.

[1] Opera Omnia, ed. Genev., vol. ii, p. 323, (Latin.)

The colicky pains may not have the same seat in all persons, but sometimes affect the pit of the stomach, sometimes occupy the umbilical region and the hypochondria, at others they may seize upon the hypogastrium and torture the lumbar region; but whenever they return in the same patient, they almost invariably seek their former habitation." The difference in the manifestation of sensation, according to whether the nerve was in its normal or in an abnormal condition of sensibility, has not been attended to, and additional confusion has been produced in the theory of colic, by establishing a classification according to the source of irritation from which the disease took its origin. Nobody objected to bilious, saburral, or flatulent colic, being placed among the neuralgiæ, although few would have consented to class pain, caused by a burn or by a whitlow, as *neuralgia a combustione*, or *a panaritio*.

Anatomical research has not, up to the present time, demonstrated any structural lesions in the ganglia and plexuses of the sympathetic. Dr. Ségond[1] alone, who has observed the endemic cholera of Cayenne, communicates a few post-mortem records, in which the hypertrophy, the alteration in colour, and the induration of the ganglia, and even of the individual nerves coming from the sympathetic, is dwelt upon. We do not wish to impugn the truthfulness of this inquirer; still we are forced to confess, that in order firmly to establish the morbid changes of the sympathetic, the authority of an anatomist who is thoroughly skilled in such researches, is indispensable to prevent misconceptions and to obviate the confusion of normal and abnormal conditions.

The existence of other diseased states affords a soil favorable to the development of mesenteric neuralgia, such as hysteria, arthritis, whether undeveloped or concealed, hæmorrhoidal affections, helminthiasis, and especially tænia. Among the exciting causes we find catarrh, wet feet, cold beverages taken while the body is heated, suppressed perspiration of the feet, diarrhœa, and mental affections, as fright or anger, to be the most fertile sources.

The malady presents a threatening aspect if it passes into ileus. There is a tendency to relapse. The fear that prevails

[1] Essai sur la Nevralgie du grand Sympathique; Paris, 1837, pp. 28-9.

of the supervention of intestinal inflammation is not justified by actual observation.

Our success in the *treatment* of mesenteric neuralgia depends mainly upon a proper alternation of evacuant remedies and opium. The older physicians paid particular attention to this point, (Fernel, Rivière, and others,) and we owe to the practical genius of Sydenham numerous excellent hints, and much valuable advice. At times the simple laxatives suffice, such as castor oil; but we find the drastic purgatives more effectual, such as croton oil, or syrup of buckthorn, aided by enemata with an emulsion of assafœtida with linseed oil and sulphate of soda. When we have obtained several evacuations we must at once exhibit opium, and not in too minute doses; we must give at least half a grain to the adult, with eight to ten drops of the simple tincture[1] in a clyster. Frictions of the abdomen with warm oil, warm fomentations, and tepid baths, are valuable adjuncts. In advanced degrees, and if ileus supervenes, clysters of an infusion of tobacco may be had recourse to. When repeated attacks of mesenteric neuralgia have occurred in hypochondriac or hæmorrhoidal subjects, it is important to attend to the disturbances which have occurred in the glandular secreting apparatus of the intestinal tube. In such cases the warm mineral baths of Carlsbad, Wiesbaden, or Ems, or the internal administration of the waters of Marienbad, are often most beneficial; their employment renders the subsequent use of sea baths all the more safe.

We shall fail of success unless the treatment be supported by a well-directed regimen. Of the various kinds of exercises, riding on horseback, which was praised by Sydenham as a specific, is to be most recommended.

A species of neuralgia of the mesenteric plexuses, originating in poisoning by lead, or colica saturnina, deserves to be separately considered, as its symptoms are peculiarly modified by the exciting cause. The earlier Viennese school, among whom we may mention De Haen[1] and Stoll,[2] deserve considerable

[1] [The Tinctura Crocata, the Vinum Opii of the British Pharmacopœias, and the Tinctura simplex of the Prussian Pharmacopœias, contain six grains of opium to one drachm.—Ed.]

[2] Ratio Medendi, vol. iii, p. 73; vol. x, p. 4.

[3] Ibid., vol. ii, p. 240.

merit for their observation and treatment of the disease. In modern times medical literature has been greatly enriched by the classical work of Tanquerel des Planches.[1]

The actual disease is preceded by constipation after previous relaxation, by a sense of oppression at the epigastrium, eructations, and nausea; these precursory symptoms may continue for days and weeks. Pinching, twisting, and oppressive pains then supervene; they generally occupy the umbilical region, but also frequently the epigastrium and the hypogastrium; for the most part permanent, and but rarely shifting their position, they take place in paroxysms differing in duration from a few minutes to several hours; they often rise to the highest pitch especially at night, and then cease, or only remit, so as to leave annoying sensations in the intervals. In most cases the pain is relieved by external pressure applied to the abdominal parietes; this is generally indicated by the position of the patient, who may be found lying on his belly, or bending forward and pressing his hands firmly against his abdomen. The derangement of sensibility is commonly accompanied by disturbance of the motor system; the abdominal walls are generally tense and hard, either throughout or only partially, and this may be a permanent condition, or, though less frequently, occurring or disappearing with the paroxysm of pain. The abdominal parietes are, in rare cases, drawn in, and when this is the case it is chiefly at the umbilicus. If the pain is less intense the walls of the abdomen remain soft; I have seen this to be the case even when the pain is very severe, but they never present tympanitic distension. Tanquerel[2] has been the first to demonstrate contractions in the intestinal canal. Many patients complain of a constriction of the anus when the pain is at the climax, and this, as well as the difficulty which then offers to the exhibition of enemata, sufficiently indicate the existence of spasm. During the paroxysm it is difficult to introduce the finger into the rectum; and when it is done, it is securely grasped by the violent contraction of the sphincter. Above the sphincter the parietes of the rectum are found to approach one another, and to be almost in contact; every fit of pain causes them to contract to such an extent that the

[1] Traité des Maladies de Plomb ou Saturnines; Paris, 1839.

[2] Ibid., vol. i, p. 209.

exploring finger almost appears incarcerated at the anus. As the pain remits the contraction also yields. A similar effect may occasionally be observed to occur in the contractile tissues of the urinary and sexual organs, when the pain attacks these regions; the symptoms which then present themselves are —urgent desire to micturate, an impossibility to introduce the catheter into the bladder, sudden arrest of the flow of urine, and a drawing up of one or both testicles.

The symptom to be mentioned next in order to the pain is constipation. The intestine is very indolent, and reacts but slowly, even to drastic purges. The evacuations are scanty and laboured, and consist, at first, of dry, globular excrements, like sheep's dung. The sufferers are not unfrequently tormented by repeated empty straining. It is exceptional to meet with diarrhœa in connection with lead colic; but Tanquerel[1] states that during an epidemic of diarrhœa, several patients labouring under colica pictonum were attacked and recovered under the use of the ordinary purgative treatment of this disease. There is generally a troublesome sense of nausea, with which, especially if there be tenderness of the epigastrium, vomiting of biliary, fetid matters is often associated; no chemical examination has, as yet, determined whether these matters contain any lead. The tongue very rarely continues clean; it is gradually thickly coated, and often has a yellow tinge. There is no appetite, and intestinal gases are more frequently discharged upwards than downwards. The urine is light, of a pale yellow colour, the skin dry and of a normal temperature. The most frequent changes are perceived in the pulse; it is generally retarded, firm, and hard, and these characters are the more marked, the more violent the paroxysm; they disappear with its subsidence. Lentin,[2] who may be quoted as a most careful observer, became acquainted with the disease in the mines of the Harz mountains, and remarks distinctly that when the pains of colica pictonum are at their height, which they generally are during the first four days, he invariably found the pulse very slow but full; in proportion as the number of beats in the minute was augmented, the hope of evacuation and relief

[1] Loc. cit., p. 204.

[2] Beiträge zur ausübenden Arzneiwissenschaft, vol. i, p. 385.

increased. Stoll states that when we meet with a pulse of such hardness as to resemble an iron wire, it is pathognomonic of the affection, and the most enduring of all symptoms, though it is not rarely often altogether absent.

There are several characters of lead-poisoning, which prevail more or less uniformly; these are a sallow, earthy complexion, resulting from the anæmic condition of the patient, emaciation, a bluish slatey colour of the gums, surrounding the teeth, which themselves assume a brown tinge.

A peculiar interest attaches to the complications and metastases of saturnine neuralgia. Thus it frequently alternates with pain in the extremities, or is associated with them. Paralysis not unfrequently supervenes, and it generally affects the extensor muscles of the upper extremities, and particularly of the hands and fingers. Neuralgic symptoms, for the most part, precede; the two rarely coexist, and run their course together, and least of all do we meet with a sudden occurrence of the paralysis in the middle of an attack of colic, causing the latter to cease. Many patients remain exempt from the colic when they have become paralytic. In others, the imperfectly cured paralysis is aggravated by every fresh attack of colic. We possess no proofs of the occurrence of paralysis in distinct sections of the intestine, following lead colic; it is not probable, as we do not meet with tympanitic distension during life, and as there is no excessive dilatation of individual parts with a relaxed and softened state of the contractile parietes of the intestine. Besides paralysis, we also find eclampsia saturnina occurring as a complication of neuralgic lead affections; it rarely accompanies or alternates with it, but generally after the colic has run its entire course, the cerebral affection makes its appearance.

Colica pictonum is characterised by great variability in its phenomena, which often occur very abruptly, and by fits and starts. It is exceptional to see a uniform increase and decline of the malady. When the pain is at its height, the pain often suddenly ceases, and recurs as unexpectedly. Even the final close of the disease not unfrequently takes place in this manner; it appears all at once to be cut off, and the patient is scarcely to be recognised. Nor is this variable character one of time only, but shows itself occasionally also with regard

to the seat; the pain presenting itself alternately in the hypogastric, mesenteric, or renal plexuses.

The *duration* of the disease is influenced greatly by external circumstances, and does not, to a great extent, depend upon the intrinsic character of the disease. If the patient withdraws from his injurious occupation and employs suitable remedies, it does not last long, and may endure from a few days to some weeks. Under less favorable circumstances it extends over several months, is less intense, and presents temporary exacerbations.

Lead colic is not often complicated with other maladies. It is rare to meet with it associated with inflammation of the intestines. It is also worth mentioning that phthisis pulmonary rarely occurs in patients afflicted with it.

Among 1217 persons, subject to lead colic, who came under Tanquerel's notice, only 55 were tuberculous, and the experience of Dr. Sander,[1] medical superintendent of mines, accords with that of other experienced physicians, that workmen in silver mines are never seen to suffer from pulmonary consumption; even hereditary predisposition, the greatest fatigue of the respiratory organs, and the constant change of temperature to which they are exposed, and which predispose other miners peculiarly to early and fatal pulmonary diseases, do not induce it in those subject to lead colic. The influence of the prevailing epidemic constitution is undeniable; thus, we have already mentioned that Tanquerel noticed the supervention of diarrhœa. During the cholera it was observed that a much smaller number of lead workmen were attacked with colic than is usually the case; Stoll[2] mentions that he has seen it associated with a bilious summer fever, and Dr. Sander has watched it during the prevalence of epidemic typhus.

The anatomical results of post-mortem investigations of cases of lead colic, which ended fatally from the supervention of other diseases, are extremely meagre. Andral pointedly alludes to the absence of all appreciable changes in the intestine and its glandular apparatus.[3] In one third of the cases that came

[1] See this author's excellent treatise: 'Ueber Chronische Bleivergiftung auf einigen Silberhütten am Harze,' in Casper's Wochenschrift für die gesammte Heilk., 1836, p. 17.

[2] Ratio Medendi, vol. iii, p. 260.

[3] Clinique Médicale, 3d edit., vol. ii, p. 229.

under his notice, Tanquerel observed that the intestines were crowded together into a small compass, though without any diminution of their calibre, and in one seventh there was marked tumefaction of the glands of Brunner. In a single case there was hypertrophy of the ventral ganglia of the sympathetic, to such an extent that they were double and treble the normal size.[1] Chemistry promises more satisfactory results, as metallic lead has been discovered not only in the excrements, but also in the intestines, the muscles, and even in the brain.[2]

The disease originates most commonly in the introduction into the system of molecules of oxide of lead, which are floating in the atmosphere, or have been volatilised by fire; it is rarely induced by the manipulation of metallic lead; consequently, all trades which necessitate the inspiration or the deglutition of finely-divided lead, or cause it to be deposited on the skin, are peculiarly liable to it,—these are especially the workmen in whitelead manufactories, silver melters, decorators, painters, colourmen, and potters. The development of the affection is favoured in persons living under such circumstances by several predisposing influences, such as early life, the male sex, (as seen in manufactories where females are also employed,) and the heat of summer; Sander mentions foggy and dull weather in the mines, which keeps down the naturally heavy vapours of lead, and prevents their diffusion, and also debauchery and the abuse of brandy. However, we occasionally find individuals who appear to enjoy a remarkable immunity in spite of all these influences, extending through a long series of years, and even through the entire life.

A cause of lead colic, which can scarcely be met with now-a-days, is the poisoning of wine, and especially of cider, either from intentional adulteration, or from these beverages being prepared in presses or vessels lined with lead. This colica pictonum was most accurately demonstrated by George Baker,[3] in 1767; but previously it was attributed to other influences,—to the consumption of fruit, (thus the older writers distinguish colica vegetabilis from colica metallica,)

[1] Loc. cit., p. 319.

[2] Tanquerel, p. 326.

[3] On the cause of the Endemial Colic of Devonshire, in Transact. of the London College of Physicians, vols. i, ii, iii.

to epidemic[1] or endemic agencies. In the West Indies a colic is indigenous, known by the name of *dry bellyache*, which John Hunter[2] laid to the fault of the lead contained in the rum, although we require most careful investigation to decide the point. Lead colic has frequently been observed to follow the use of provisions prepared or kept in crockery glazed with a salt of lead, and similar diseases are known to occur in animals inhabiting the lead mine districts, in consequence of their drinking the water of springs and rivulets impregnated with particles of lead.[3]

All writers on the subject agree that the disease rarely threatens life. Among the 1217 cases that occurred to Tanquerel, there was but one in which the repeated employment of large doses of sugar of lead for hypertrophy of the heart had given rise to the disease, associated with pains in the joints and paralysis of the upper extremities, and after a duration of three months terminated in death, but where no clue was afforded by the post-mortem.[4] In other fatal cases death resulted from eclampsia or some other disease, which was in no way connected with the lead poisoning; and even these are but rare. Among the 500 patients labouring under colica pictonum, which were treated at the Hôpital de La Charité at Paris, during a period of eight years, five,[5] and of the 1217 mentioned by Tanquerel,[6] only nine, died. Nevertheless, the prognosis, though not alarming as regards life, is rendered unsatisfactory by two circumstances,—the proclivity to paralysis, and the great liability to relapse if the cause of the malady be not avoided.

The results of medical treatment are best determined by instituting a comparison between the time required for spontaneous recovery and the period in which the various modes of treatment achieve a cure. We owe such a comparison to Tanquerel,[7] who has ascertained, by an investigation

[1] Huxham; Opusculum de morbo colico Damnoncorum, eoque maxime epidemico, in his—Opera Phys. Med. cura Reichel, vol. iii, p. 54.

[2] Christison, a Treatise on Poisons, 3d edit., p. 497.

[3] Fuchs; Die Schädlichen Einflüsse der Bleibergwerke auf die Gesundheit der Hausthiere insbesondere des Rindviehes; Berlin, 1842.

[4] Loc. cit., p. 472.

[5] Andral; Clinique Médicale, vol. ii, p. 210.

[6] Loc. cit., p. 301.

[7] Loc. cit., pp. 350 and 352.

of this point, that scarcely one half of the lead patients get well spontaneously, and that they are three and four times longer in doing so than those subjected to treatment; while those who remained uncured, or whose convalescence was retarded, rapidly recovered under suitable measures. Similar analyses, which, however, can only be instituted satisfactorily by hospital physicians, would promote the real progress and critical reform of therapeutics. This is one of the great desiderata of medicine, and its achievement would effectually silence the empty boasting of the various disreputable brotherhoods claiming relationship with philosophic inquirers.

Among the various methods of treatment of lead colic, whose value we have now to determine, there is one which deserves an especial mention, as it has been extensively employed for a century past; it is that known as the treatment of La Charité of Paris, which has obtained a high reputation, and consists in the alternation of drastic evacuants, whether emetic, purgative, or diaphoretic, with opium. It has been described in detail by Merat[1] and Tanquerel. The average duration of the course is seven days; and while the supervention of other saturnine affections, as paralysis or convulsions, is rarely observed, it is as rarely followed by relapses.[2] Notwithstanding these advantages, the method requires to be altered, as it is extremely complicated, and bears, so to say, a rococo stamp. I am far from instituting a comparison between the number of my own observations and the gigantic scale above alluded to; still, having had extensive opportunities of watching lead colic at an earlier period of my life, I may be allowed to mention a system of treatment which I have followed with success. I commence with the exhibition of croton oil, of which from two to three drops commonly suffice to produce the desired evacuation. They may be prescribed in the following form:—

℞. Ol. Crotonis, gutt. iij;
Sacchari Albi, ʒss.
M. Divide massam in pulveres tres. Sumat æger pulverem unum alterna quaque hora.

This is followed in the evening with half a grain of pure

[1] Traité de la Colique Métallique, pp. 156—160.
[2] Tanquerel, loc. cit., pp. 381—392.

opium. On the ensuing morning the croton oil is repeated. During the day the patient takes an almond oil emulsion, and repeats the opiate at night. As the patients generally applied shortly after the commencement of the attack, I rarely found that more than five or six days were necessary to effect a cure. The narcotising method has been recommended by one of the greatest observers of all times, Stoll,[1] who, after exhibiting a saline purge, trusted to opium, unless there was violent vomiting, in which case he omitted the former and exhibited the opium alone, at the rate of ten grains in four and twenty hours. His words are: "Opium neutiquam morbum palliat, cum perseverantia sanat." Even in the convalescent stage he prescribed from six to eight grains with a bitter mixture, after which the bowels were easily and freely relieved. Stoll himself made the observation that the largest doses of opium given in lead colic produce neither unconsciousness nor pruriginous sweats. Thirty-three years ago I saw my tutor, the late Professor Horn, administer opium and warm baths with excellent results in the clinical wards of the Charité at Berlin. Tanquerel is also willing to admit the efficacy both of opium and the muriate of morphia, although he gives the preference to the exclusive use of croton oil, both on account of the rapidity and permanency of the cure. He gives one drop of it for a dose in a spoonful of barley-water. If neither purging nor vomiting ensue, the dose is to be repeated after seven or eight hours, or an enema of senna to be administered. If the pain has not ceased on the fourth day, a second clyster is to be exhibited, and repeated up to the eighth day. In this case the dose of croton oil may also be renewed. If the patient vomits the remedy, it must be given with castor oil, or exhibited in a double dose as an enema. It is also useful to accompany the medicine with the copious use of barley-water, mixed with a large proportion of honey. The average duration of treatment in 370 patients was from four to five days. In 36 out of 460 patients no amelioration was obtained, and a few were unable to bear it at all. The effect is said to be less apparent in cold, damp weather, than when it is hot and dry.[2]

[1] Ratio Medendi, vol. iii, p. 254.

[2] Loc. cit., pp. 395—402.

We are only too apt to draw conclusions as to the nature of a disease from the effect produced by our remedies, though the deductions are eminently liable to fallacy. In the present instance we are not without conflicting opinions. The curative powers of opium are supposed to be indicative of spasm—the drastic purges of paralysis in the intestine. But although we observe a spasmodic contraction of the rectum during the climax of the pain, are we justified in assuming a spasm that continues for weeks? and are not all the threatening characters of intestinal paralysis absent? Are we not rather bound to assume that the pain causes immobility, which may attack the intestinal muscles and give rise to a loss of peristaltic action, in the same manner as the voluntary muscles are affected in sciatica or rheumatic affections, where soothing remedies or violent exercise may equally succeed in bringing back the power of movement?

With regard to the regimen of the patient, we have to point out the importance of avoiding an injurious trade, of a residence in pure air, and of cautioning against a too copious dietary.[1]

[1] [The occurrence of lead colic, from the use of water tainted with salts of that metal, is not alluded to by our author; and as the question is likely to suggest itself to the reader, it may be well to state, that leaden pipes and cisterns are unknown in Germany.—Ed.]

CHAPTER XIII.

HYPERÆSTHESIA OF THE HYPOGASTRIC PLEXUS.

This neuralgic affection of the sympathetic has not hitherto been described; it manifests itself by tenderness of the hypogastric region, by a sense of pain and weight in the sacral region, and a feeling of pressure upon the rectum and bladder, and in the female sex upon the uterus and vagina. Sympathetic pains in the thighs and in the range of the hæmorrhoidal nerves are frequent. In females the symptoms much resemble those of prolapsus or retroversion of the uterus, but they occur in paroxysms, and are not relieved by a change of position of the body, and on exploration the uterus is not found to have an abnormal direction. In men these symptoms are commonly known by the term, hæmorrhoidal colic.

Hypogastric neuralgia is unknown in infancy. In the male sex it prevails in the middle period of life. In the female it often shows itself at the development of puberty, and not unfrequently accompanies the menstrual period. It is often associated with an hysterical diathesis. At times it only appears in the period of decrepitude. In both sexes venereal excesses frequently give rise to it. It is evident that the lumbar portion of the spinal cord is implicated, from the painful sensations in the small of the back, from which the neuralgic attack frequently proceeds. As in other neuralgiæ in the range of the sympathetic system, we meet with secondary effects, as manifested by disturbances in the circulation and in the secretions of the affected organs.

Both circumstances must be regarded in the treatment. We may direct our remedies to the lower portion of the spinal cord, and apply cupping, leeches, flying blisters, douches, and cold sponging. If morbid secretions have been set up in the uterine system, the Ems waters are to be recommended in irritable subjects, or the Kissingen waters if we have to deal with torpid constitutions. Antihysteric medicines serve as palliatives. If

the neuralgia is concentrated in the rectum, small doses of nux vomica are very serviceable; from one to two grains of the powder of nux vomica, or one third of a grain of the spirituous extract. We must attend to the regulation of the bowels, which may be effected, in hæmorrhoidal subjects, by the aid of the preparations of sulphur. We may also advantageously combine purgatives with narcotics, as in the following formula:

℞. Extracti Conii, ℈j;
Extracti Hyoscyami, gr. xv;
Pulveris Rhei, ℥ss;
Extracti Taraxaci, q. s.

Ut fiat massa in pilulas xxx dividenda. Conspergentur pulvere radicis Iridis florentinæ. S. secunda vel tertia quaque hora pilula sumenda.

CHAPTER XIV.

HYPERÆSTHESIA OF THE SPERMATIC PLEXUS.

This hyperæsthesia[1] is manifested by pain, which, in the male sex, attacks the testis. The patient complains of extreme tenderness and pain, which is generally limited to one point of the testicle, is increased by pressure and movement, and from time to time attains such a height that the slightest touch is unbearable, and that the supine position alone affords some relief. There is but trivial swelling of the testicle. The epididymis and spermatic cord are also attacked by the neuralgia, in which case the mere weight of the testicle is agonising, and the patient has no rest without a suspender. These symptoms are often accompanied by pains in the back and legs, and by great irritability of the stomach, causing frequent vomiting.

The reaction upon the mind is greater here than in other neuralgic affections; the patient loses all zest for life and its enjoyments, and looks to castration as his sole hope of relief. I had one patient of this kind, who was attacked at the time he was engaged to be married. In spite of the serious objections of a celebrated surgeon, whom I called in to consultation, and notwithstanding my urgent representations of his peculiar relation at the time, he insisted upon the operation, which was undertaken to prevent any more serious result. Eight days later a pain supervened in the remaining testicle, which the gentleman, however, as the wedding was approaching, preferred retaining; he soon enjoyed a perfect recovery. Excepting that there were a few dilated vessels, there was no trace of any abnormal condition. Sir Astley Cooper has removed the testicle, against his will, in three cases, in all of which he found the testicle to be perfectly healthy.

The affection continues for months and years, with free

[1] Astley Cooper; Observations on the Structure and Diseases of the Testis. Chapter iv. on the Irritable Testis: London, 1830.

intermissions, which the patient looks upon as a proof of recovery, until some neglect of the usual precautions as to movement or position shows the fallacy of his judgment.

The age of puberty and manhood favour the development of spermatic neuralgia, the causes of which are otherwise enveloped in obscurity.

Sir Astley Cooper, whose opinion is generally referred to with confidence, looks upon the affection as analogous to tic douloureux, and as more frequently dependent upon a centric than upon a peripheral morbid state. In pursuance of this view, he combines with the local treatment the remedies applicable to general debility and irritability, as steel, quinine, sea-baths, and sea voyages to warm climates, and the use of narcotics, (Conium in doses of gr. iij; Opium, gr. j; Extr. Stramonii, gr. ss; Belladonna, gr. ss—gr. iij, three times a day.) For external use we find the extract of belladonna, ice, opium, and camphor recommended, as also the application of tincture of iodine, until an erythema is produced, a blister to the groin and the thighs, dressed with ung. sabinæ cum opio, evaporating lotions with dilute spirits of wine and ether, or of nitre and muriate of ammonia. Sir Astley also advises, at the commencement of the malady, the exhibition of calomel and opium, until a slight salivation is produced, and the compound decoction of sarsaparilla which promotes all the secretions, and moderates the increased irritability. In some cases copulation gives momentary relief, but is generally followed by more severe pain. In those cases in which, owing to the inefficiency of all the remedies employed, the patients themselves insisted upon the removal of the testes, the pain did not recur after the operation. In one of my patients the persevering employment of assafœtida was followed by a satisfactory result.

In connection with this subject I must mention a neuralgia affecting the entire passage, or only a portion, of the urethra, which has hitherto been observed exclusively in the male sex; its symptoms are agonising pain or itching in the part affected. Erections and coition increase the pain; which has been preceded by gonorrhœa of shorter or longer duration. In some cases cauterisation, and the injection of a solution of nitrate of silver, have effected a cure after all other remedies have failed.

We also find that the sexual excitement may be abnormal;

and, as hyperæsthesia, it attacks the female sex more frequently than the male. I have only met with one case of this kind occurring in a man of thirty-eight years of age, who complained of pain at the occiput, vertigo, and the frequent sensation as of an ejaculation of semen, without erections or any discharge from the urethra, or turbidity of the urine from an admixture of semen. In females this species of hyperæsthesia is generally due to a centric cause, and is complicated with nymphomania.

A pain of a neuralgic character has also been observed, and described as affecting a sexual organ in females, which is within the range of the hypogastric plexus, the uterus.[1]

The malady is characterised by the following symptoms: there is pain at the inferior portion of the abdomen, along the brim of the pelvis, and in the lumbar region. The pain is increased by the upright posture and by exercise, it diminishes when a horizontal posture is assumed. From time to time more violent paroxysms supervene, especially previous and immediately subsequent to menstruation; they disappear again on the application of proper treatment, and leave the usual permanent tenderness. The uterus is extremely sensitive to the touch. Excepting, however, a little swelling or rather tension of the cervix uteri, there is no departure from the normal structure and form, nor is it to be discovered during the further course of the disease. Menstruation often continues to be effected duly, though it may become scanty, and cease altogether. The intestinal canal is torpid, but strong purgatives instantly bring back violent attacks of pain.

Excessive bodily exertion, at a time when the uterus is peculiarly irritable, during the catamenia or the persistence of the lochia, is apt to bring it on, the patient having been previously subject to dysmenorrhœa, and being endowed with a generally irritable habit.

A cure is effected with great difficulty, and there is a great tendency to relapse.

To treat the complaint successfully, the horizontal posture, continued for a considerable time, even after the pains have abated, is absolutely necessary. Blood is recommended to be abstracted locally, by the application of cupping to the sacral

[1] See—Robert Gooch, the Irritable Uterus, in—an Account of some of the most important Diseases peculiar to Women; London, 1831, p. 299.

and hypogastric regions, especially at the commencement of the disease. Mild narcotics may be exhibited by the mouth and by enema. Counter-irritation to the small of the back, in the shape of blisters or setons, and hip-baths, are advisable; and if the powers of the constitution are low, and there be an hysterical diathesis, we must have recourse to steel. In some cases a good result has been obtained by the employment of mercurials, though they should only be exhibited at the commencement, and while there is considerable vigour.

CHAPTER XV.

HYPERÆSTHESIA OF THE SPINAL CORD AND THE BRAIN.

In the previous description of the hyperæsthesiæ of the cerebro-spinal nerves, we have dwelt upon the distinction that should be made, according as the affection is seated in the peripheral or central parts of the nerve; we have also established the laws of isolated conduction and eccentric phenomena, which are of the utmost value in reference to diagnosis and treatment. The hyperæsthetic conditions of the spinal cord and the brain present a different aspect, for we possess no physiological key to them, and we have to deal with a rudis indigestaque moles of pathological facts. These difficulties seemed to render it necessary that I should pay more attention to the configuration and distribution of the pain accompanying disorganisation of the spinal cord and the brain, and that I should compare it with the pain occurring in those conditions which, judging from the characters of neuralgia occurring in the peripheral nerves, may be interpreted as hyperæsthesiæ. In accordance with this rule, we find that the ordinary manifestation of pain occurs in the central organ itself, and that it is more or less radiated towards the peripheral nerves. The irradiation, which can only be effected in a central organ, not only passes to sensitive, but also to motor conductors, and in the brain it also meets with sensual and psychical conductors.

HYPERÆSTHESIA OF THE SPINAL CORD.

Experimental researches.—At the time when the first edition of this work was published, some doubts were still entertained of the fact that the posterior columns of the spinal cord were the agents of sensation. A more accurate method of experimenting, and a great discovery made quite recently,

have since removed all uncertainty on the subject. Longet[1] has demonstrated, that if the lumbar portion of the cord be divided in one of the larger animals, and the poles of a galvanic pile are applied to one or both of the posterior tracts of the lower section, no evidence is afforded of sensation or movement in the lower extremities, whereas violent pain and consequent movements result in the anterior extremities the instant the poles are applied to the posterior columns of the upper portion of the cord. Mechanical irritation is followed by similar effects, though in a lower degree. During etherisation, of which we shall have occasion to speak in detail in the chapter on anæsthesia, the posterior tracts of the spinal cord equally prove to be insusceptible of any species of irritation, as shown in Longet's and Flourens' experiments.

The *surgical* observations, almost without exception, refer to the *loss* of motion and sensation during and after injury of the spinal cord. In but few of them the pain is spoken of as a main feature, and among these I have discovered but one which confirms the results of the experiments. A patient who had fallen upon his back, complained of pain in the hips and in the dorsal vertebræ; the lower extremities were paralysed; the dorsal pain became daily more severe; and delirium and asphyxia having supervened, death ensued. At two points of the posterior surface, on a level with the fourth and fifth vertebræ, the meninges were lacerated, and the substance of the spinal cord had passed through the aperture.[2]

Pain is a frequent accompaniment of morbid conditions of the spinal cord, and by the complication with other phenomena we may not only recognise the existence, but also the character of the organic change. The relation to motility more particularly assists in determining the diagnosis. The pain is also characterised by being rarely confined to the back, whether in a limited or extended space, but extends to the extremities (chiefly the lower) and the trunk. On the occurrence of cerebral symptoms it ceases or becomes less conspicuous.

If we regard the diseases individually in reference to the

[1] Anatomie et Physiologie du Système Nerveux, 1842, vol. i, p. 273.

[2] Ollivier; Traité des Maladies de la moëlle épinière, 3d edit.; Paris, 1837, vol. i, p. 503.

pain in the back, we find that in spinal meningitis it is the uniform symptom. It is here much augmented by every movement of the trunk or the extremities, whether spontaneous or passive, and is not increased by external pressure applied to the back. At the same time we often meet with rigid, painful contractions of the dorsal muscles or the muscles of the extremities. But even without the contractions, the pain is of a kind to prevent muscular action, and gives rise to an amount of immobility often inducing an erroneous assumption of paralysis. It is rarely persistent, and commonly has remissions.

In myelitis the pain is circumscribed; it corresponds to the locality of the disease, and is deep-seated. It is associated with paralysis, chiefly of the inferior extremities, varying in degree, and involving the sphincters. Besides actual pain we also met with other alterations of sensation, and especially with formication. Movements of the limbs do not, in this case, increase the pain in the back. According to the seat of the inflammation there are often painful sensations in the extremities, on the cutaneous surface of the trunk, or in the viscera.

When myelitis is associated with disease of the vertebræ, it is characteristic that the pain of the back is excited and increased by the application of pressure, as well as by other external means of irritation, as by passing a hot sponge over the part.

We have finally to allude to the intense pains in the back, the trunk, and the extremities, caused by morbid growths, and especially those of a carcinomatous character, vegetating within the spinal cord, or on its membranes. In this case, lancinating pains, which dart with the rapidity of lightning from the dorsal and lumbar region to the immovable and paralysed limbs, are characteristic. Osteomalacia, which fortunately is a rare disease, is accompanied by pains of this description. In the year 1840 I attended a lady of forty years of age, in conjunction with Dr. Schönlein, whose right mamma had four years previously, after violent mental excitement, become attacked with scirrhus, which was being gradually developed. Six months before the date mentioned a pain supervened in the lumbar region, accompanied by difficulty of moving the lower

extremities, and more particularly the left leg. The pain extended to the shoulders and the nape of the neck, and wherever it appeared there was stiffness. From this period the pains in the mamma were diminished, and the scirrhous tumour was reduced in size; but the painfulness of the back, trunk, and especially of the left foot, amounted now and then to complete torture. In the progress of this agonising disease, the trunk became shortened to such an extent, that a coffin, such as might be required for a girl of twelve years, sufficed for the corpse. The pelvis was displaced; the thorax collapsed; and the ribs were distorted. A post-mortem examination was not permitted.

Hyperæsthesia of the spinal cord occurs in two forms: in one the patient is conscious; in the other he remains unconscious of the affection. The latter is a spinal malady, in the true sense of the word, as it exists without any sympathy of the brain as the organ of perception, and is not manifested by a sensation of pain, but by reflex action upon the organs of motion, and stands in an essential relation to certain convulsive processes. The most trifling excitement of centripetal nerves, especially of the cutaneous surface, by gentle oscillation of the air, by sprinkling with few drops of water, or by gentle contact, suffices, under such circumstances, to produce the most violent action; tetanus, hydrophobia, hysteria, and intoxication with strychnine, afford palpable testimony of this. This spinal hyperæsthesia renders the sufferers excessively susceptible to external impressions, so that the strongest resolution is placed in subjection, as will be more fully apparent in the account given of those diseases.

The hyperæsthesia of the spinal cord, which becomes a matter of consciousness, is characterised by pain in its different varieties. The following case, which is related by Sir C. Bell,[1] is worth repetition as bearing upon this point:

A middle-aged man complained of an agonising pain in the whole back. The moment he entered the room he sat down upon the first chair within his reach, and pressed his spine in a peculiar manner against the back of the chair. He soon, however, rose again, and walked up and down the room in great pain, stating that he only found relief by pressing his

[1] The Nervous System of the Human Body, 3d edit., 1844, p. 369.

back against the wall or the chair, or by walking up and down. If anybody assisted him in undressing he would turn round suddenly in the greatest excitement, and request that his back be taken care of. It was evident that the removal of single parts of his dress caused great pain. He would stop when he began, and then suddenly throw them off by a jerk. The pain extended over the entire back, passing equally to both sides. A gentle pressure of one finger upon the skin brought on a violent attack of pain, during which the patient twisted about and stamped with the foot. If firm pressure was applied he did not complain; on the contrary, he found relief from it, for which reason he took refuge to strong pressure and powerful friction. Four years previously, shortly before the attack of the pain, he had suffered from hæmorrhage from piles, which ceased on their removal by excision. The back exhibited traces of the various remedies applied, on the supposition of the affection being of an inflammatory character; but the treatment had remained ineffectual, or rather the pain had increased in severity.

This hyperæsthesia rarely exists alone, and still less frequently is it idiopathic. From not attending to these points, and owing to certain symptoms having received an undue attention, a phantastic caricature has been dragged into neuropathology under the name of spinal irritation, which has found, and still finds, the more willing reception among the public, as it seems to hold out a simple and rational mode by which we may explain complex conditions. The following are the characters attributed to it:

There are pains at any point of the surface or within the body, and tenderness or pain at a corresponding region of the spine, the latter being excited by contact or pressure of the vertebræ; or if it be constant, it is increased by these measures. These neuralgic phenomena are often complicated with motor symptoms.

According as one or other portion of the spine is affected, the symptoms, which may affect one or both halves of the body, vary in character and intensity. If the upper portion of the cervical vertebræ is involved, the pain traverses the parts supplied by the cutaneous branches of the second and third cervical nerves, viz., the occiput, the margin of the maxilla,

and the vicinity of the ear. If the lower portion is affected, the pain is felt at the collar bones, the shoulders, the arms, and the fingers. One or more of the cervical vertebræ are very painful to the touch, which generally, though not invariably, excites pain in the parts referred to.

When the upper dorsal region is affected, the neuralgia occurs in the surface of the thorax, and the pain in the side, or *pleurodynia neuralgica*, is a frequent symptom. This pain is distinguished from other pains in the side, of a rheumatic or pleuritic origin, by the integuments being extremely sensitive to mere contact; by the pain being very limited in extent; not increasing when the lungs expand during inspiration, nor being associated with symptoms appreciable by percussion or auscultation; and, finally, by tenderness of the upper dorsal vertebræ. If the lower dorsal vertebræ are the seat of the affection, we find that there is pain at the pit of the stomach, extending along the margin of the ribs to the back, and frequently mounting up to the breast and the neck. The seventh and eighth dorsal vertebræ are extremely sensitive to the touch and compression, by which the pain at the pit of the stomach is augmented.

If the lumbar region is affected, there is tenderness of one or more parts of the abdominal parietes; from time to time colicky attacks supervene, the lower extremities are painful, and there is tenderness of the lumbar vertebræ.

The motor phenomena that are associated with these neuralgic symptoms present, for the most part, a convulsive character. They are rarely allied to paralysis, and equally vary according to the seat of the affection. Thus spasm of the pharynx and glottis, hiccough, and a cough of a peculiar sound, mark spinal irritation of the cervical region; that of the dorsal vertebræ is characterised by palpitation, vomiting, and eructation; and ischuria characterises the affection when seated in the lumbar region of the spine. The movements of the upper and lower extremities are impeded, and the patients constantly complain of a sense of weariness and fatigue in the arms and legs.

This affection is either confined to a certain district of the spinal cord, and more particularly the dorsal region corresponding with the seventh, eighth, and ninth vertebræ, or it

shifts its seat, or it extends over the entire spine. The last is the least frequent. The symptoms in each case correspond to the seat of the affection.

It generally runs a chronic course, with an intermittent and occasionally a uniformly periodic character. The period of the development of puberty and middle age are chiefly liable to spinal neuralgia. The female sex is much more predisposed to it than the male, about three quarters of the cases appertaining to the former. Derangement of the catamenia, parturition, and indigestion, often have a close relation to this malady.

Such is the description given by certain English physicians, who to the present day have failed to achieve a reputation in their native country. It has, however, found its way across the ocean to Germany, with a mass of hasty and untrustworthy observations, and has gained many supporters, although Stilling, and after him Hirsch, have deserved well of science by demonstrating the untenable character of a portion of the above assertions and explanations. In the first edition of the present work (1840), I pointed out that to satisfy the critical demands of science we required more data about the disease in question, and that medical men, after rashly affirming its existence, had delighted in paradoxical and hypothetical arguments about it. I have since that time, both in my private and hospital practice, subjected the question of spinal irritation to a rigid inquiry, and have arrived at the conclusion, that beyond the knowledge of some irradiated sensations and reflex phenomena, it has contributed nothing either to physiology or pathology, nor is likely to do so. The patients generally being females, much deception is practised upon the medical man; and, in addition to this, the whole range of hysterical and neuralgic affections has been made available to obtain the materials for interpreting, or rather for misinterpreting, the affection. In hysteria the tendency to sympathetic and reflex phenomena is frequently so much exalted, that irritation of the skin of the posterior as well as of the anterior surface of the trunk, on the sternum, the abdomen, and especially pressure applied to the ovarian region, is calculated to produce the entire group of neuralgic and spasmodic phenomena. Vaillez and others have made valuable contributions to our knowledge of cervical and intercostal neu-

ralgia, and that alone has withdrawn a large class of affections from the sphere of spinal irritation, which its advocates are peculiarly fond of appropriating. If we subtract the spinal pain which accompanies the diseases of various organs, for instance, the stomach or the liver, and is increased by internal pressure, and often associated with pain at the epigastrium, the doctrine of spinal irritation is deprived of its entire foundation, and takes its place among those fictions which have always found their way into pathology when physiology was undergoing a revolution, and have for a time been admitted as matters of fact. It is curious to see how such exclusive views of medical men may affect the general public. The following occurrence, which happened to me a short time back, is a remarkable instance of this. I was requested to visit a lady of twenty-two years of age in a provincial town, who had been subjected to a variety of treatment, and had at last become possessed with the idea that her soul had taken up its abode in the cervical portion of the spine, where it felt the slightest movement of the trunk or limbs, or even of the fingers, effected by her own will or by others, as severe pain. She assured me that the most severe pain was thus induced, which passed in the direction of the part that was moved. She had excluded light and fresh air from her room, and had condemned herself to rigorous immobility in bed. I made some serious representations to her, which had a beneficial effect upon her morale, and her recovery, which was aided by cold affusion of the head and back, ensued more speedily than we may expect to see many of our medical brethren discard the notion of spinal irritation. Therapeutics have benefited as little by the prevailing influence of this doctrine. How little has been realised of all the magnificent prognostications! We might, indeed, have hoped that the female back would have enjoyed a longer respite from therapeutic interference, after the extravagancies which had but just preceded in the assumption of vertebral disease.

It is not unreasonable to suppose that hyperæsthesia with a neuralgic character, originating in poisoning with lead, may depend upon an affection of the sensory portion of the spinal cord. Tanquerel des Planches terms it, in his excellent work, *arthralgia saturnina;* and it is always a pleasing duty to refer to

this author, on account of the copious and valuable observations which he offers.

The inferior extremities are the chief seat of the painful sensations; they are generally both affected at the same time, though not with equal intensity. The upper extremities follow next in point of liability to the affection, which generally affects the flexors; then the lumbar region, the thoracic parietes, and least frequently the face and the scalp. The pains are superficial, or penetrate to the deeper parts, the muscles, the bones, and the large joints. They are of a tearing, boring, crushing, or burning character, or resemble electric shocks; they are diminished by pressure and friction, and are increased by motion; they never fly from one limb to another. Paroxysms alternate with free intervals, which, however, are not entirely exempt from annoying sensations, as numbness, formication, or debility. The attacks of pain are generally more frequent and severer at night. When they come on, the muscles, especially those of the calves, contract spasmodically, causing the most intense agony. At other times the muscles tremble and oscillate. Trivial irritation, such as the mere approach and passage of the hand, may suffice to produce violent reflex action in the muscles of the thigh and leg. Colour and temperature are unaltered, and no œdema is to be found in any part.

The affection commonly comes on suddenly, and runs its course rapidly. It rarely is of short duration or of varying intensity. If properly treated, it lasts from three to six days. When left to itself, the disease may at times disappear as rapidly; but it generally endures for weeks or months. It may exist as an isolated affection, or it may be associated with lead colic and paralysis; it frequently alternates with colic. It may coexist with paralysis, but the two in that case affect different parts, the latter as a rule appearing in the upper extremities and in the extensors.

The causes of arthralgia saturnina are identical with those of lead colic. Persons working in sugar of lead manufactories, and especially those engaged in the fabrication of minium, are most liable to this variety of neuralgia, which is second in frequency only to lead colic.

Two sections recorded by Tanquerel exhibit no visible changes.

It is reserved for future investigations to subject the spinal cord to a chemical analysis; and this is the more to be desired, as in cases of epilepsy and apoplexy, resulting from poisoning by lead, particles of the metal have been traced in the brain.[1] A cure is most rapidly and safely effected by the daily employment of warm sulphur baths, made by adding five or six ounces of the sulphuret of potassium to a bath. If recovery is slow, it may be accelerated by the exhibition of drastic purges and opium. The best safeguard against a relapse is the avoidance of the noxious trade.

[1] See Todd: Practical Remarks on Gout, Rheumatic Fever, and Chronic Rheumatism of the Joints, 1843, p. 23.

CHAPTER XVI.

HYPERÆSTHESIA OF THE BRAIN.

Experimental researches.—The earlier experiments made upon living animals to determine the sensibility of the brain, were conducted in an extremely unsatisfactory and coarse manner, so much so that the exact lesion was not even determined after death; this reproach applies to such men as Haller[1] and Zinn, the results could not therefore be very trustworthy. The recent method of conducting the experiments has been more promising, and has yielded much fruit in the hands of men like Magendie[2] and Longet.[3] The experiments instituted by them upon rabbits and dogs, prove that the corpora restiformia, the posterior or inferior surface of the pons varolii, and the processus cerebelli ad corpora quadragemina, are the most sensitive, the slightest touch applied to these parts causing violent pain. When the animal is etherised, sensibility is as completely in abeyance in these parts as in the peripheral nerves of sensation, the posterior roots of the spinal nerves, and the posterior tracts of the spinal cord. The hemispheres of the cerebrum and cerebellum and the corpus callosum, are utterly insensible to any kind of injury. When these experiments are made, it is necessary, as Magendie very correctly remarks, carefully to avoid irritating the sensitive branches of the fifth pair in their passage through the cranium.

Surgical experience corresponds with the results afforded by experiment; it proves that the brain is insensible to injury, but it also demonstrates that when, as a subsequent result, inflammation, suppuration, softening, and induration of the

[1] A. v. Haller; Opera Minora, vol. i, p. 350; Lausannæ, 1763.

[2] Leçons sur les Fonctions et les Maladies du Système Nerveux; Paris, 1839, vol. i, p. 176.

[3] Anatomie et Physiologie du Système Nerveux, &c.; Paris, 1842, vol. i, pp. 426 and 436.

cerebral matter ensue, pain makes its appearance. It is a remarkable phenomenon, that the portions of cerebral matter which have penetrated through the wound in the cranium, even when in a state of inflammation and fungous degeneration, are insensible to pressure or incision.

With the exception of atrophy of the brain, none of its diseases occur unaccompanied by pain. This pain is generally characterised by the following peculiarities: it is permanently confined to a larger or smaller portion of the cranium; there is a sensation of pressure, tension, or pulsation, or the pain has a shooting, tearing, or rolling character; it varies in intensity; it is excited and exalted by bodily or mental fatigue, by movement of the head, by an elevated temperature, by highly-spiced food, and by long and sound sleep: the pain is relieved by raising the head, or by assuming the erect position, or resting the head firmly against something; it possesses a remittent character; there are intervals, but during the intermissions the health is impaired; spasmodic action or paralysis, generally confined to one side of the face or trunk, supervene, or the organs of sense become afflicted with anæsthesia, and delirium follows; the pain abates, and ceases altogether as the paralysis and sopor advance.

It is a matter of much difficulty to define these features with accuracy sufficient for the purposes of diagnosis, as the organ is withdrawn from examination by a rigid osseous case; still one means of approach has been overlooked, which we ought certainly to avail ourselves of. It is a fact that during every vigorous and long-continued act of expiration, the brain is elevated, the cerebellum being passed against the tentorium, the cerebrum against the cranial bones; we may easily convince ourselves of the latter by placing the hand upon the fontanelli of a child while it is crying. The old surgeons acting upon a knowledge of this circumstance, recommended their patients, who suffered from penetrating wounds of the cranium, to cough violently or to sneeze, in order to promote the discharge of blood or pus. We may therefore employ continued expiration, or holding the breathing during expiration, in cerebral diseases, especially if it affects the surface, as a sort of substitute for the external pressure, which we so frequently have recourse to in the exploration of the abdomen or thorax. The patients alluded to generally complain of the headache being brought on

by straining in defecation; for the purposes of diagnosis we may cause the patient to imitate this effort, by holding the breath for some time during expiration, while the abdominal muscles are contracted; this at once brings on the pain, or if it was present, increases it to the utmost. The same occurs in screaming, coughing, and vomiting. Similar experiments may be instituted during inspiration, during which the brain falls and approaches the basis of the skull;[1] we may thus obtain some information on the diseases affecting the base of the cerebrum and cerebellum.

We are more in the habit of using the influence of position and movement of the head, as a means of diagnosis. Swinging the head from side to side, stooping down, rising rapidly from the horizontal to an erect position, are apt to produce and augment the pain.

The modifications and relations of cephalalgia to definite diseases of the brain, are important in a diagnostic point of view. Before investigating them it is necessary to point out that, in order to determine the existence of the pain in these diseases, it is even more necessary than in affections of other organs, to have an accurate history and a continued series of observations of the patient. This is necessary, not only on account of the longer intermissions, but also on account of the recurrence of pain when other symptoms, and especially paralysis, supervene, and on account of the loss of memory which ensues in many cases. For this reason the observations collected in private practice are peculiarly valuable.

Pain frequently accompanies morbid growths developed upon the surface, or within the substance of the brain; it prevails especially in the latter case.

Tubercular deposit.—Wilhelmina M—, aged 4 years, had been subject to headache from her second year, commencing after

[1] Ravina found that during inspiration he was able to introduce a quill between the skull and the brain of a pointer. On placing a cork cylinder divided into degrees upon the brain, it sank during ordinary inspiration one line, during strong inspiration three lines. If a cylindrical glass tube filled with water was placed upon the brain, the fluid disappeared during inspiration, and returned discoloured with blood on expiration. See Lund: Physiologische Resultate der Vivisectionen neuerer Zeit, p. 149; and the still more recent experiments of Dr. Ecker, in Physiologische Untersuchungen über die Bewegungen des Gehirns und Rückenmarks, 1843, pp. 27—102, and pp. 112—122.

scarlet fever, and gradually increasing in severity. I was called to see the child in October, 1830. It pointed to the forehead as the seat of pain; its mother related that the paroxysms of pain recurred repeatedly during the day, and that when they were at their height, retching and vomiting took place. During the remissions the child was much exhausted, took no interest in the games of its playmates, and was very somnolent. The extremities were emaciated, the abdomen swollen and hard, the cheeks puffy, the complexion yellowish, the skin flabby and dry, the appetite capricious, and the bowels generally constipated. The erect posture was not borne long unless the head was supported. If the head was moved from side to side, which I attempted myself several times, the child evidently suffered pain, and began to cry. The various remedies exhibited had no effect, leeches were applied from time to time, the ung. antimonii potassio-tartartis was rubbed in at the nape of the neck, and applied to it. At the beginning of December the debility increased; she was no longer able to leave her bed; there were febricitations and continued somnolency. The belly fell in, and hard tumours of mesenteric glands could be distinctly felt. On the 7th December, profound sopor occurred; on the 8th, the right arm was convulsed; and on the 9th death ensued.—*Sectio cadav.:* After removing the skull-cap and the dura mater, the arachnoid covering the cerebrum was found opaque, and along the falciform process it was covered with some small albuminous exudations. The hemispheres were of a firm consistency, and the medullary vessels were injected. The lateral ventricles, especially the left, were dilated, and filled with a quantity of clear serous fluid; their parietes were softened. At the base of the hemispheres of the cerebellum, there were four tubercular masses disposed pairwise on each side. The larger ones were of the size of a small walnut, and of a rounded shape; they were seated in the biventral lobe, one on the right, the other on the left side; they lay in a cavity, and were so loose that mere pressure on the surrounding parts caused them to fall out; they were hard and of a yellow colour, the lesser ones were more deeply imbedded, occupying the innermost divisions of the posterior inferior lobe, and they were more firmly connected with the adjacent cerebral tissue. The liver was pale in colour and of considerable size, so as almost to fill

both hypochondria. The mesenteric glands were much swollen, and contained tubercular deposits, which, at many points, had passed into softening.

Second case.—Albert S—, aged 5 years, whose physical and intellectual development was retarded for his age, for he was unable to speak connectedly and fluently, was emaciated and potbellied; had complained for more than a year of pain in his head, chiefly in the forehead. The mother, who was a poor widow, obliged to earn her bread out of the house, was unable to devote the necessary attention to the boy, and did not call in medical advice until sopor and somnolency had set in. So it happened that at my first visit, on the 6th of July, 1832, I found a hopeless case of acute hydrocephalus; the symptomatic character of which, however, the history of the case, meagre as it was, established with sufficient accuracy. Death followed two days after with violent convulsions.—*Sectio cadav.:* The vessels of the pia mater and the medullary substance were much injected; the arachnoid was covered with albuminous exudations along the line of the falciform process; the ventricles of the brain were distended with a clear serous fluid; the septum lucidum, the fornix, and the parietes of the ventricles, presented a very soft consistency, and broke up under the pressure of the finger into a pulpy mass. In the upper posterior lobe of the right hemisphere (lobus semilunaris), at the distance of a few lines from the posterior edge, there was a tubercular deposit, of the size of a cherry kernel of a yellowish colour and hard consistency, projecting somewhat above the brain, and easily detached; the place where it had lain was marked by a small fossa. In the medullary matter of the same hemisphere another tubercle was found near the corpus rhomboideum, of the size of a pea. The mesenteric glands were much enlarged, and filled with tubercular matter.

Third case.—William E—, æt. five years, had for some time attracted the attention of his parents by a change in his character, by what they termed a dreamy habit; he resembled a person in a fit of abstraction, or a half-drunken man, and had a rolling gait. A nasal blennorrhœa, which had continued from his birth, had ceased six months previously; the boy had since frequently complained of violent, tearing pains in the right ear. I was called to see him on the 31st of May, 1830.

Vomiting had supervened, which was especially brought on by the erect position of the head; there was constipation, sopor, and much fever. The abdomen was sunk to such an extent that a deep cavity was formed between the crest of the ilium and the projecting ribs. The pulse became slow, respiration irregular and grunting; the pupils became dilated and immovable, the eyeballs rigid, the conjunctiva reddened, and the power of vision ceased. Vigorous treatment was ineffectually adopted, and, on the 6th of June, death ensued with violent convulsions.—*Sectio:* After removing the skull-cap, the brain rose like an elastic body that has been relieved from pressure, and could not be replaced within its bony case; the dura mater was tightly stretched over the gyri, which were closely compressed. The arachnoid was opaque, adherent to the pia mater at the vertex, and covered with small exudations resembling patches of muguet. The medullary substance of the cerebral hemispheres was surcharged with blood, and of very firm consistency. The ventricles were distended with a quantity of yellow serous fluid, and their parietes and the fornix softened. At the base of the brain a considerable sero-albuminous extravasation covered the optic commissure. In the medullary substance of the right hemisphere of the cerebellum, a tubercular deposit, of the size of a small cherry, was discovered; it was of a yellow colour and very firm texture, and on being removed, which was easily done, a cavity remained in the surrounding medullary tissue. A large quantity of clear serous fluid bubbled from the spinal canal, especially when pressure was exerted on the ribs.

Cases of hydatid tumours.—1. In the year 1821, I made a post-mortem examination of a girl of fifteen years, who had been under the care of Dr. Formey; she had menstruated for a year, had constantly complained of pain at the right side of the head, and died with symptoms of acute hydrocephalus. The arachnoid was found opaque and thickened; the gyri of the cerebrum were considerably flattened; the ventricles, particularly the right one, were excessively distended; and they each contained about four ounces of a whey-coloured fluid. In the right lateral ventricle there was a tumour of the size of a pigeon's egg, proceeding from the choroid plexus, and consisting of an hydatid mass interwoven with tumid vessels. On the

floor of the posterior horn of the same ventricle there was an erosion of the cerebral matter.

2. A girl of six years was almost constantly complaining of headache; she generally supported her forehead on her hand; and even when asleep, rested the head on the edge of the bedstead. She lost her liveliness, and became dull and apathetic. A fortnight previous to her demise, an acute cerebral affection supervened, with vomiting, increase of pain, amaurosis of the left eye, coma, and convulsions. — On removing the cranium and dura mater, the arachnoid was found covered with small granulations all along the falciform process. The right lateral ventricle was gorged with serous fluid, while the left was almost empty. On the anterior half of the left thalamus opticus, a white substance of the size of a bean, and of membranous structure, was found. More minute examination proved it to be a collapsed and defunct hydatid, the inner surface of which was covered with a quantity of small granulations of the size and appearance of sabulous bodies.[1]

From a comparison with the observations of other authors in Nasse's[2] instructive and critical work, it follows, that of all the symptoms accompanying tumours in the brain, headache is the most constant. From Andral's[3] collection of cases it also appears, that out of thirty-six cases of tumours in the cerebellum, there was headache in twenty-six. Lastly we find, as the result of Abercrombie's eleven observations of cerebral tumours, that were mainly accompanied by pain, and of which nine were tubercular and two albuminous, that three only were seated in the cerebrum, three in the cerebrum and cerebellum, and five in the latter only. They occurred chiefly in infancy, which my own experience ratifies; and they were frequently complicated, as my own experience equally confirms, with tubercles of the abdominal and thoracic viscera.

[1] Rudolphi; Entozoorum Synopsis, p. 183. Echinococcus hominis: 'Vesica externa simplex vel duplex, cujus superficiei internæ insidunt entozoa plurima, arenulam mentientia, quorum corpus, obovatum, caput uncinorum corona, et osculis suctoriis instructum.'

[2] Ueber Geschwülste im Gehirn, an Appendix to the Translation of Abercrombie's Work on the Diseases of the Brain and Spinal Cord; Bonn, 1821, p. 66.

[3] Clinique Médicale, 3d edit., vol. v, p. 729.

Among the tumours within the cavity of the cranium which are generally accompanied by pain, we must also mention aneurismal tumours, both of the vertebral arteries and of the carotids. The pain is generally of a pulsating character.[1]

In the cases of cerebral carcinoma that have been hitherto published, pain was a very frequent symptom, both when the disease was seated in the cerebellum and when it was in the cerebrum; the latter was the case in the majority of instances.[2] The pain often presented the peculiar character of carcinoma; sometimes it was more of a neuralgic character, radiating from one point to other parts, and in either case it associated itself with similar pains of the trunk and extremities. Among the structural morbid processes of the brain, softening and the formation of abscesses are most frequently and uniformly accompanied by pain.

Those trustworthy observers, Lallemand, Rostan, Andral, and Fuchs, are unanimous as to the symptoms of softening of the brain. The pain either precedes the actual occurrence of the disease for a considerable time, or commences with the first stage and continues during the second. I watched the case of a young woman of 28 years of age, in the two hemispheres of whose brain patches of softening were found; the case will be detailed in the section on cerebral paralysis; but it bears upon the present question, as a severe oppressive headache preceded the actual eruption of the disease for seven years. The pain recurred at irregular intervals, enduring for days and even weeks; was diminished by cold; but became unbearable during the warm season; so that the only way in which the patient could obtain relief was by remaining in a cool cellar. If the patient, even after sopor has supervened, answers to a repeated, loud question concerning the seat of the pain, by slowly carrying the hand to the side of the head opposite to the paralysed side, it is considered by Rostan to be pathognomonic of the disease. If this patient is of a very indolent habit or advanced in years, spontaneous complaints of

[1] A collection of the Cases hitherto observed is given in Stumpf; Dissertatio de aneurysmatibus arteriarum cerebri; Berolini, 1836, pp. 11—18.

[2] See Andral's Comparative Collection of 43 Cases, in the Clinique Médicale, vol. v, p. 63.

pain in the head cease, as they also do after the sopor has taken place.

Pain is an almost constant companion to that interesting form of softening, which affects the corpus callosum, septum lucidum, fornix, and the ventricular parietes, and has been termed central softening by Abercrombie,[1] whose admirable researches have first served to draw attention to the affection. Among sixteen cases communicated by him, pain is only absent in one. The following case is the one in which I have found it most intense:

A girl seven years of age was seized on the 27th of May, 1835, with headache, vomiting, diarrhœa, and febricitations. On the following days there was distinct evidence of a cerebral affection; the little patient complained chiefly of a permanent deep-seated pain in the head of great intensity, rendering it impossible for her to sit up in bed, even for a few minutes. No remedy, either local abstraction of blood, or cold, availed to palliate the pain. Vomiting, photophobia, reddening of the conjunctiva, delirium, bed-picking, and collapse of the abdominal parietes ensued, and death occurred on the eighteenth day of the disease, after coma and convulsions.—At the post-mortem we found the cerebral matter charged with blood. The septum lucidum, the fornix, and the walls of the lateral ventricles, were converted into a shapeless pulp, which was so soft that slight pressure of the finger served to displace it. All the remaining parts of the cerebrum and cerebellum presented a normal consistency.

Induration of the cerebral tissue occurs much more rarely than softening. The following case is an instance of induration giving rise to enduring pain:

A girl of six years of age had fallen down stairs three years previous to my being consulted about her. She complained of constant pain in the forehead, which at times was so violent as to cause her to scream out. The right eye began to squint; and six months previously a discharge of yellow pus took place from the right ear, though without exerting any influence upon the pain. The child was apparently in good condition; had

[1] Pathological and Practical Researches on Diseases of the Brain and Spinal Cord; Edinburgh, 1836, pp. 127—139.

a healthy complexion; its muscular development was good; it enjoyed a good appetite, and the bowels were regular. When the mother brought her to me on the 8th of November, 1823, she stated that in addition to the above-mentioned symptoms, the child had been much indisposed for some days; that she vomited all her food, was constipated, and frequently was attacked by flushing of the face and vertigo. The pupils were dilated and sluggish; the otorrhœa continued uninterruptedly. On the following morning I found the pulse accelerated, the face very red and puffy, and the eye fixed. Vomiting occurred frequently, and the constipation continued. Leeches, cold lotions applied to the head, and the exhibition of purgative medicines, produced no effect. Sopor supervened, which could only be momentarily broken by calling out loudly and shaking the patient. She screamed out frequently. On the 18th of November the pulse became excessively quick; convulsions seized both sides of the body; and on the 19th she died calmly. The otorrhœa continued up to the last moment.—*Sectio:* On the left hemisphere of the cerebrum, at about the middle, there was in the dura mater an osseous concretion, of irregular shape, and about a quarter of an inch in diameter. The arachnoid and pia mater were adherent along the falciform process, and at several other points, to the dura mater. The arachnoid was opaque throughout, and of an opalescent character. The brain itself appeared extremely bulky, so that on removal from the skull it resembled the brain of an adult. Its consistency was very considerable. The roof of the ventricles was arched, and presented distinct fluctuation. On puncturing the left lateral ventricle, which was much distended, about four ounces of a yellowish serous fluid exuded. The septum lucidum was of a pulpy consistency, and torn through in the middle. At the inner edge of the two posterior lobes of the cerebrum there was a spot of indurated substance of half an inch in circumference, and of the colour of bees-wax. The posterior edge of the two hemispheres of the cerebellum were so firmly adherent to the dura mater, that it was necessary to use the knife for the purpose of separating them. To the extent of a quarter of an inch on both sides of this spot, the cerebellum was degenerated into a hard mass, the transverse section of which presented a jagged appearance and yellowish-brown tint,

owing to the admixture of the yellow (sic) cerebral substance. The remainder of the cerebellum was of very soft consistency, and its limits sharply marked off. The surfaces of both petrous bones were normal.

Of all the diseases of the brain, none is so frequently or so uniformly accompanied by pain as the formation of abscesses, either in the cerebrum or cerebellum. In Lallemand's 'Recherches Anatomico Pathologiques sur l'Encéphale et ses Dépendances,' vols. i and ii, nineteen cases of abscesses are communicated, among which fourteen are expressly stated to have been accompanied by pain. In the cases mentioned by Abercrombie, it was never absent. On one occasion I have observed that it had a peculiar pulsating character.

In September, 1822, I was consulted by a slater, æt. 22, who had fallen from a high scaffolding a fortnight previously. He came down upon his feet, and had since complained of weakness, chilliness, and darting pains in the legs. On account of his utter poverty he was received into the hospital of the Charité. While quitting the bath he was suddenly attacked with complete paralysis of the left arm and leg. His consciousness, power of speech, and features remained unaffected. There was, however, a squint in the left eye, and the patient complained of a violent boring pain in the fundus of the corresponding orbit; but both disappeared on the application of general and local bloodletting. At the same time a pain supervened at the vertex, which gradually increased, and which the young man compared to the sensation of a bird pecking away his brains. A short time previous to the fatal issue, which occurred four weeks after the accident, sensibility was restored to the paralysed limbs.

Post-mortem examination of the head.—The arachnoid was opalescent, and between this membrane and the pia mater there was a sero-gelatinous exudation. The brain presented a firmer consistency on the left than on the right side. The medullary substance was dotted with red spots. Both lateral ventricles contained a yellow serous fluid, the right more than the left. At the point of junction, between the corpus striatum and the optic thalamus of the right side, I found a cavity filled with thin, yellow pus, the walls of which were invested with a retiform membrane traversed by a few small

vessels. The former was rendered more distinct by pouring upon it a small jet of water.

In otorrhœa, which is generally accompanied by disorganisation, chiefly of a tubercular character, of the petrous portion of the temporal bone, the supervention of cephalalgia is a symptom of considerable importance, as it indicates the development of a cerebral affection. In twelve cases which I have analysed, I found suppuration and the formation of abscess in the vicinity of the affected bone, with enduring pain on the affected side of the head, after the supervention of which the otalgia had generally ceased.[1]

Hæmorrhage in the brain is much less frequently accompanied by pain than other diseases of the organ. In these cases, which may be considered as parallel to the occurrence of pain in rupture in the thoracic and abdominal viscera, the patient utters a sudden shriek; he has the distinct sense of laceration occurring in the brain. Vomiting supervenes, and the pulse becomes small and oppressed. After an interval of varying duration, the mind becomes clouded, sopor and paralysis supervene; the disease then takes its usual course, and almost always terminates fatally. Cheyne[2] describes a case of this kind, which happened to a naval officer, æt. 33, who while sitting at breakfast was seized with nausea, vomiting, and such intense headache that he said he felt that one half of the brain was torn from the other, and that his end was approaching. He rubbed his benumbed hands; complained constantly of the enormous pain; was seized with rigors about midday; became comatose towards evening, and died at midnight.

The post-mortem showed both hemispheres torn asunder by an enormous hæmorrhagic extravasation, which had destroyed the corpus callosum and had penetrated to the base. Abercrombie[3] communicates several illustrative cases. Headache may also occur consecutively in connection with cerebral hæmorrhage, if

[1] See Lallemand; Recherches, &c., vol. ii, pp. 80—172; and Abercrombie, loc. cit., pp. 31—39.

[2] Cases of Apoplexy and Lethargy, with observations upon the Comatose Diseases; London, 1812, p. 110.

[3] Loc. cit., p. 218, et seq.

an inflammatory condition is developed in the vicinity of the extravasation. In that case a characteristic feature presents itself in the shape of concurrent pain and contractions in the paralysed muscles, which had previously been relaxed.

Finally cerebral pain occurs as one of the most frequent accompaniments of meningitis, and forms the chief subject of complaint on the part of the patient, as long as consciousness continues or as soon as it returns.

The cerebral diseases which we have alluded to, are so frequently limited to certain regions and portions of the organ, that they may serve to elucidate a point of extreme diagnostic importance, as to whether the seat of the pain corresponds to the seat of the disease? The question may be generally answered in the negative. Circumscribed alterations not unfrequently give rise to pain in the entire head or in one half; derangement in the cerebellum is often characterised by pain in the forehead; in some patients the pain shifts about, while others again always feel the pain at that part of the head which happens to occupy the lowest position.

We are as little able to determine the especial nature of the organic change, by the character of the pain, excepting in those rare cases of rupture. The sensation of boiling, hammering, trickling, even if increased by bending down and shaking the head, as frequently accompanies hard immovable tumours, as accumulations of pus and other fluids. The sensation as if the head were ready to burst, accompanies diseases of trifling extent, while tumours of great bulk excite no feelings at all commensurate with their size. The situation of the disease affords no satisfactory key to the intensity and varieties of the pain. Though it is not to be denied that diseases of the cerebellum and the parts near the pons varolii are very commonly accompanied by pain, we must not forget the vicinity of the most powerful sensory nerve, the trigeminus, nor overlook the fact that the great majority of diseases of the cerebrum are associated with pain. In what manner are we to reconcile these facts with the results of physiological experiments? Assuredly not by the theory that insensible organs become sensitive during a state of irritation and inflammation: we can have no stronger proof of the fallaciousness of this argument than

presented by the fact of a portion of brain which has been forced out of the skull, and is attacked with inflammation, yet continuing painless. We obtain more information from the effect produced by pressure exerted upon the brain. Both hemispheres may be extirpated in a living animal without inducing paralysis, whilst the injection of a few drachms of fluid into the cranial cavity, produces hemiplegia of the opposite side. This is owing to the uniform pressure exerted upon the distant motor nerves. In the same way irritants act upon the sensitive points, though the seat of the former may be at a great distance; the different parts of the brain seem in a measure to be responsible for one another, and probably the organs of the living brain, an organ, be it remembered, enclosed in unyielding walls, may contribute to the propagation of an irritant influence; surgical observations of penetrating wounds of the skull, as well as the effect already alluded to, of holding the breath, appear to confirm this.

It is necessary that more attention should be paid to the circumstances accompanying organic cerebral affections, than they generally receive. The prevailing fault is a one-sided mode of viewing things; and, even in post-mortems, it is usual, as soon as some palpable lesion, as a tumour in the brain, has been discovered, to desist from a further examination of other parts of the organ. This, however, is often of extreme importance, not only for the purpose of explaining new complications, but also to account for the change in the symptoms. Thus, cephalalgia accompanying tumours, is removed by the accumulation of serous fluids in the cavities and between the membranes, while it is increased by inflammation and softening occurring in the vicinity of the tumour. Intercurrent morbid conditions affecting the constitution of the patient, operate in an analogous manner. Acute exanthematic diseases, not unfrequently excite or increase cephalalgia; it increases before the supervention of the catamenia, and ceases after the period has passed; relief is generally afforded by the abstraction of blood.

There is another more general reason for the cessation of cephalalgia, even while the cause continues in operation, and this is the exhaustion of the irritability, by the irritation itself; upon this the remittent character of the pain depends in organic

diseases of the brain. In rare cases we may even meet with regular periodicity.[1]

If from the present investigation, it results that there is much difficulty in the diagnosis of the exact character of the cerebral disease, accompanied by pain, and that it can only be approximatively determined by one who is well acquainted with the whole course of the disease, we must, on the other hand, be careful not to treat the distinction of this pain from other painful sensations in the head, as too easy; the danger of doing so is proved by the frequency with which the error is committed. The combination, the relation, and the mode of succession of the phenomena must be regarded, in order to prevent our confounding neuralgia, hemicrania, and sympathetic headache, with the affection we have been considering. The co-existent affection of the motor and intellectual sphere, fleet as it may be at the commencement of the disease, is of great importance. A momentary strabismus, when the pain is at its climax, is suspicious; a sense of numbness in one hand, or an entire extremity, is significative; short attacks of unconsciousness and sopor, scarcely admit of any doubt. The pain generally increases after sleep. In dyspeptic headache and hemicrania the pain may attain such a height as to prevent the other functions from being exercised; the patient condemns himself to the greatest quiet, both physical and mental; but neither the motor nor intellectual energy of the individual is at all affected. Nor must we overlook the fact that the cerebral pain bears no relation to the other symptoms. The patient complains of the former alone, and it is not obscured by accidental affections of other organs, as is so often the case in hemicrania and in dyspeptic headache. Furthermore, the succession of the phenomena is of importance, as well as the gradual disappearance of cerebral pain, as soon as the paralysis and loss of intellectual power supervene. Finally, we must consider the intervals, which are rarely free from traces of the disease, whether of a physical or psychical character, whether manifested as irritability or sluggishness, as inability to undergo fatigue, constipation, or stubborn reaction against purgatives; the duration of these intermissions may, accidentally or intentionally, be at any time,

[1] Abercrombie; loc. cit., pp. 166, 173.

shortened by influences affecting the brain. There are also other circumstances which may be made available for the diagnosis; such as the exciting cause (for instance, an external injury,) and the age of the patient. Thus cerebral pain occurring in childhood, at which period other varieties of headache are very rare, excites a suspicion of the existence of tubercle. Such a surmise would be strengthened by the coexistence of tubercles in other organs, in the lungs, the mesentery, as well as by the fact of catarrhs and blennorrhœa of the ears or nose, having preceded or accompanying the affection.

The assumption of an organic cerebral disease generally terminates all doubt on the score of diagnosis, and the consequence is that the technical treatment of cerebral pain has not enjoyed any progress. And, in fact, we advance but little by the routine of prescriptions, though we may do something by attending to two points:

1. No case should be treated without a previous careful examination of the head. It is unaccountable that whilst a complaint of pain in the abdomen or thorax is at once followed by an ocular examination of the parts, the practitioner does not afford equal attention to the head, although injuries of the head are not unusual. When the examination is made, the patient himself often recalls to memory a fall or a blow which he had received not long previously. If we can discover a cicatrix, an induration of the integuments, or an indentation of the bone, we must assure ourselves, after removing the hair, of its extent, and not fail to employ vigorous remedies; of these there is none equal to a crucial incision, and the insertion of a large issue. I have seen a remarkable instance of the success of such treatment, and cannot omit introducing it here.

In the year 1827 I was called to a girl of 24 years of age, whom I found considerably emaciated, affected with aphonia and amblyopia on both eyes. I ascertained from the relatives that she had for several years been subject to a pain extending from the occiput to the forehead, which had lately increased to the utmost pitch, and on every change of position, from the horizontal to the upright posture, was accompanied by vertigo and a sense of fainting. Memory and vision had become gradually impaired, and were quite destroyed; amenorrhœa,

idiotcy, and a paralytic condition of the lower extremities, and at last œdema of the legs, had supervened.

The medical gentleman who had attended her before I saw her, considered the fatal issue inevitable. No light could be thrown upon the origin of this marked and advanced cerebral affection, by the history of the case; I obtained it by examining the head. I discovered a cicatrix in the bone on the right side of the occiput, marked by a deep indentation, and about half an inch in length. The relatives now remembered that the patient had met with a fall down stairs six years ago, and that subsequently she had been struck on the back of the head by a clothes-brush thrown at her in play by a younger brother. My deceased friend Dieffenbach, who convinced himself of the injury, and agreed with me as to the propriety of the treatment suggested, made an extensive crucial incision into the integuments sufficient to establish an issue with twelve peas. Suppuration was maintained for three months, with the most satisfactory result. The general health of the patient improved, the œdema disappeared, the pain diminished, vision returned, menstruation was re-established, and the feet gradually recovered their strength. The memory of the girl, however, had suffered so much, that she was compelled to resume her instruction in reading and in needlework. Six months later, the cure was so effectually established that the patient was able to enjoy the pleasures of dancing.

A proceeding similar to the one just detailed promises relief, and even a cure, even where there has been no local injury, provided it is not adopted too late.

2. As we have seen that inflammation is apt to supervene in the vicinity of organic disease of the brain, by which not only the pain is increased, but also the danger is magnified, antiphlogistic treatment becomes necessary; this is the more imperatively demanded, as the more violent paroxysms of cerebral pain are accompanied by vascular excitement. General and local bleeding by cupping and leeches, cold applications, and derivation to the intestinal canal, allay the threatened storm, which is often interpreted, especially when occurring in children, as idiopathic meningitis, and these remedies aid in preserving the patient.

At all events it is necessary to avoid violent and extreme measures; especially the shock of shower and vapour baths, and treatment by inunction and starvation.[1]

[1] [The treatment by inunction and starvation—Schmier- und Hunger-kur—has been especially recommended and employed by Professor Rust, who introduced it chiefly for the cure of inveterate syphilitic affections. The directions for the method to be pursued are so minute, and they are so little likely to be adopted in this country, that we may refer those curious in such matters for the details to Rust's Magazin für die gesammte Heilkunde, vol. i, 1816; or Phœbus, Handbuch der Arzneiverordnungslehre, vol. ii, p. 566.—Ed.]

CHAPTER XVII.

NEURALGIA CEREBRALIS.

Hemicrania, la Migrène.

After certain premonitory symptoms, of which chilliness, yawning, bulimia, anorexia, and irritable temper are the most frequent, or without any warning of the kind, one side of the head, and more generally the left, is attacked with pain; it is commonly circumscribed and limited to the supra-orbital and temporal regions, or it extends up to the hairy part of the head; at first trifling, it soon increases more or less rapidly, and is accompanied by a sense of weight and tension. The motor and intellectual functions of the brain increase the pain, for which reason the patient always courts quiet and solitude. Sympathetic affections of the branches of the fifth pair, and of the nerves of sense, are rarely absent. The eye of the corresponding side is painful; it weeps and appears smaller. Light and noise cause pain; scotomata and tinnitus aurium supervene. The hair is very sensitive to the touch, and occasionally stands on end. When the attack has reached its climax, and is approaching its termination, nausea and vomiting come on, and thus a quantity of mucous and bilious matter is got rid of. The attack is generally closed by a profound and refreshing sleep.

The duration of the paroxysms generally extends to several hours, though it may last an entire day and more. The intervals, of three or four weeks' duration, are generally distinguished by the patient enjoying perfect health; in the female sex hemicrania is commonly associated with the menstrual period, and occurs before or after it, but rarely during its continuance.

The disease runs a chronic course; it may be protracted for several years, or half the individual's life, without an essential alteration in the symptoms.

A predisposition is afforded by inheritance, by the female

sex, and by early life. I have seen girls of seven or eight years of age attacked, whose mothers had been subject to this neuralgic affection. Tissot even asserts that persons who have not been subject to hemicrania up to their five and twentieth year, continue to enjoy an exemption. It has been a prevailing error since Tissot's time, to attribute too much influence to disturbances of the digestive organs in predisposing to the malady; they and mental affections are, however, undoubtedly the most common exciting causes.

Although we are not likely to confound this affection now-a-days with facial neuralgia, as older authors, Wepfer and Tissot, have done, we often find that it is not sufficiently distinguished from other kinds of cerebral pain. I refer to the preceding description of the pain accompanying organic cerebral affections, and now merely sum up shortly the characters by which we recognise cerebral neuralgia; there is a definite group of symptoms which recur in the same individual in a similar manner during the attacks; there is an alternation of periods of pain and freedom from suffering; and there is an absence of other nervous affections in spite of the long continuance of the disease.

Hemicrania generally diminishes in advanced age, or entirely ceases; in females it often terminates at the period of decrepitude. Febrile diseases, and the appearance of gout or impetiginous eruptions, often produce a similar result.

In our treatment, whether with a view to palliation or to a radical cure, we cannot be sufficiently on our guard against the abuse of medicines. During the attack, the recumbent position, with the head raised, affords relief, which is also promoted by darkening the room, by quietude, and by giving tepid tea to assist the vomiting. A mild clyster towards the end of the attack is beneficial to produce action of the bowels. Remedies applied to the head externally are unnecessary; the majority of patients find relief by compressing the head with a bandage, others prefer exposing it; but few benefit by heat or cold. The local abstraction of blood is to be avoided.

In attempting a radical cure, the state of the digestive organs must be attended to. If the secretions of the liver and intestinal glands are depraved, which is more frequently the case in men than in women, the natural or artificial mineral

waters of Marienbad, Kissingen, or even Karlsbad, and the gum-resins (gummata resolventia) in combination with alkalies, are indicated. If there is atonic dyspepsia, we must have recourse to bitters, among which the menyanthes trifoliata is particularly lauded by Tissot. When we are satisfied of the purely neuralgic character of the affection, it is well to avoid any violent interference, and to bear in mind the chronic character of the disease, and the probability of its yielding with advancing life. The remedies most likely to be serviceable without producing any injurious effect, are the prolonged exhibition of an infusion of quassia, of menyanthes combined with valerian, of the waters of Spa or Pyrmont if there be an anæmic constitution, taken in moderate doses of from one to two wine-glasses in the morning before breakfast, even during winter; of bark or sulphate of quina if there be marked periodicity, or we may have recourse to sea bathing. Arsenic, in the shape of Fowler's solution, in doses of from four to eight drops three times daily, and nitrate of silver, from one third to half a grain twice a day, are sometimes of use. Counter-irritation, especially by discharging issues, is to be avoided. We should pay the greatest attention to the most minute regulation of the diet, a point in which the physician's directions are commonly neglected, whilst doctoring dilettanti are able to boast of persevering obedience.

HYPERÆSTHESIA PSYCHICA.

Hypochondriasis.

I apply the term *hyperæsthesia psychica* to that frame of mind in which abnormal sensations are excited and maintained by directing the attention to impressions; it is commonly called *hypochondriasis.*

To elucidate this position more fully, we may mention that in health the activity of the nerves of sensation is constant; it does not require to be produced by irritants, it is merely strengthened and modified by them.[1] There is always a large stock of sensations at command, among which we may at will

[1] Henle; Ueber das Gedächtniss in den Sinnen, Wochenschr. für die gesammte Heilkunde, 1838, p. 283.

select food for our perceptive or reasoning powers; by directing the attention to the sensations, or to the details of an impression, we may give them a definite shape and a permanent character.

The stimuli that influence the sensitive functions are of an objective and subjective, or simply a subjective kind. Among the latter we yield to the stimuli of mental impressions a more extensive sphere of action than is commonly accorded them. Nobody doubts the effect of voluptuous thoughts, but the doctrine that pain may result from reflecting upon pain is objected to; and yet the result of a vivid impression of nausea, horrification, tickling or itching, which we are familiar with, is nothing but an abnormal sensation.

The corporeal manifestation of the ideal by means of sensation, occupies the same position as the corporeal manifestation of the ideal by motion; but it is not effected, unless it be to heighten the whirl of a sensual gratification. When it is the case, it shows itself in as marked a manner as the manifestation of a mental impression by motion; the best proof of this is the morbid condition which we are about to consider.[1] The hypochondriac is, so to say, a virtuoso on the sensitive nerves.

In hypochondriasis, doubts and anxiety about his health oppress the patient, and they generally take the shape of a conviction of a malady affecting a special organ, and in the first instance the stomach and intestinal canal with the digestive powers. The tongue and the fæces are examined, and there are frequent complaints about a weight, tension, burning, and fulness about the pit of the stomach; this is made out to be the seat of the disease: here we find the sensations which become more vivid the more frequently the mind is directed to them. The patient now ponders upon the cause of his malady, and a peculiar inclination to reading medical books, to consulting friends and doctors, is manifested. In this manner the vulgar prejudices and the prevailing medical system are reflected in the hypochondriac, just as social and political

[1] The influence of the will and the direction of the mind in producing and fixing sensations, has not as yet been properly applied to therapeutics. There are some indications on the subject in Dr. Lebenheim's Essay, Ueber die psychische Behandlung somatischer Krankheiten, in Wochenschr. fur die gesammte Heilkunde, 1838, p. 489.

conditions are mirrored in mania. Every hypochondriac is at first a martyr to the wind. Eructations and flatulence are convincing arguments, and the generation of gases in the stomach and the intestines increases in the ratio of the attention bestowed upon the symptoms. In Broussais' times, the educated hypochondriac in France imagined himself afflicted with gastritis, and in the same manner the German of forty years since was tortured with atrabiliary follies, to which he was led by diligent contemplation and study of the delineations contained in Kempf's book. But the imagination does not deal exclusively with the hypochondria; the thoracic organs are also visited in a similar manner. The sensation of anxiety and dyspnœa is one which the hypochondriac most frequently induces spontaneously and augments. The motor action at the same time participates; the heart beats and pulsates irregularly. A suspicion of a disease of the heart seizes the patient, until an accidental catarrh directs his attention to the lungs. The distress and palpitation cease, and phthisis becomes the nightmare that absorbs every consideration, and in the same ratio the patient complains of pains in the chest; the cough becomes more and more urgent; and the sputa are carefully preserved and carefully examined. Not alone, however, in the abdomen and chest are the phenomena excited; they are also produced by imagination and reflection in the sensory relations of the head; hyperæsthesiæ of the nerves of sense, pains in the cranium and face supervene, there is weight and tension, vertigo, and oppression; an approaching attack of apoplexy tortures the patient; when he suddenly hears of cholera, his head is set at liberty, and the precursors of the mortal malady seize upon his devoted intestines.

We will now examine the patient a little more closely. He frequently presents a healthy, florid appearance; we find the abdomen soft, perhaps yielding a more extended tympanitic sound to percussion; the heart and lung sounds are normal, and the patient's troubles are alleviated by exercise, while they are augmented by indolence, which the individual prefers. The appetite is variable, according to the direction of the patient's thoughts. Nutrition proceeds undisturbed. The physician's mind is eased, but the patient finds no peace. He appears spell-bound within the magic circle of his sensations, and he sur-

rounds himself with stores of dietetic and medicinal substances. Here we see one fasting, there one who is constantly drinking cold water, another again consumes gallons of elixir vitæ. Let us lastly cast a look upon the state of our patient's mind and his feelings. In spite of the constant thoughts about impending death and pain, there is no tædium vitæ; the more physicians, the more he is satisfied; he likes to change them as often as he would change a poultice. There is no alteration in his moral character, no bad disposition manifested—he continues to feel the same love for his wife and child, although their occasional maladies appear to him trifles compared with his own; he cares for the maintenance of his family, and attends to his usual occupation, although his morbid sensations taint his every thought.

This condition either continues isolated, or it passes into another, which it is of extreme importance to appreciate well. Structural changes supervene in those organs which have hitherto been the stage upon which so many sensations, determined or increased by the patient's attention, have appeared. Thus a new period of the disease commences. The digestive organs, the liver, the stomach, the spleen, and intestinal canal, most frequently become the seat of the affection. Tumefaction or induration of the organs may be recognised by palpation and percussion. Hypertrophy and dilatation attack the heart, tubercle is deposited in the lungs. The organs of sense and the brain are less frequently affected. The constitutional symptoms correspond to the local malady. The complexion alters, nutrition becomes impaired, and hectic follows, but through the chaos of symptoms the red line of hypochondriasis may be traced; the sensations that are really present are increased, and new ons are generated by the power of the imagination. Thus we see a man with a jaundiced complexion, and a tumefaction of the right hypochondrium, which causes teasing and oppressive sensations, after meeting with an amaurotic person, himself troubled with abnormal appearances in his eye, and the fear of becoming blind.

The supervention of material changes in parts, the sensitive nerves of which had been mainly called into play in this disease, is a point of physiological consequence, and is allied to similar phenomena, occurring in the healthy state. It is well

known, that a longing for food causes a copious discharge of saliva, emotion induces a flow of tears, libidinous thoughts give rise to erections and seminal discharges, immoral suggestions call forth blushes.[1] If we imagine such operations to assume a permanent character, and to become associated with a depressed state of the mind, which powerfully influences the nutritive processes, the supervention of a trophoneurosis no longer presents anything to be surprised at; the more so as derangement of vegetative processes is so often observed to accompany affections of the sensitive nerves.

Causes.—Hypochondriasis cannot be developed unless there be a morbid tendency in the individual to dwell upon his own sensations. Childhood ought *à priori* to be exempt from it, and so it is. A certain intellectual maturity, a capability of independent thought, is necessary to its production; the predisposition to the affection therefore prevails from puberty to old age. For the same reason, the female sex is not prone to hypochondriasis, for although the female possesses a great capability of receiving impressions, she is but little able to direct them by an effort of the will. The influence of climate has not been determined, but it appears that a temperate climate, damp and cool countries, such as the north-west region of Europe, favour the affection more than the south. An indolent, quiet, sedentary mode of life predisposes, and the more so if it has been preceded by great activity. Professional men and seamen are prone to it. Dangerous epidemics act as exciting causes. At the time when Asiatic cholera prevailed, hypochondriasis was almost epidemic. Inoculation or the suspicion of poisoning, syphiliphobia, the fear of mercury, or hydrophobia, may act in this way. Thus Chomel relates the case of a physician at Lyons, who, in the year 1817, had assisted in the dissection of several hydrophobic patients, and was seized with the conviction that he had been inoculated with the virus. He lost his appetite

[1] My friend Professor Dieffenbach informed me, that he had a short time previously examined a small tumour of the pudenda of a lady, and that he observed the labia and the entrance to the vagina to be suddenly suffused like the cheeks.

[The point of this remark is rather etymological than medical, but could not be rendered in English; it would take up more space to explain it than it deserves, we therefore refer the curious reader to the original. We may, however, add, that it turns upon the German word for a blush: Schamröthe.—Ed.]

end was sleepless; when he attempted to drink, he was seized with choking and spasm of the pharynx; for three days he wandered about the streets in a state of despair, till at last his friends succeeded in convincing him that his malady had its foundation in his mind.[1] We must also mention the reading of medical books as a frequent cause of hypochondriasis; it is much encouraged by the numerous popular medical works now published, and by the homœopathic, hydropathic, and other pathic trashes that are now in vogue. The study of medicine is also adapted to produce the disease in subjects at all predisposed to it, and the hypochondriasis of students may serve as a mirror of the prevailing direction of our science. While a few decennia ago diseases of the heart were the terror of the hypochondriac, he has lately devoted his attention more to nervous diseases. It cannot be denied that hypochondriasis may be communicated; it is not only tedious to live with a person of this description, but it may become a source of danger. The healthy individual's attention is directed more to himself, and the hypochondriac, as Dubois[2] justly remarks, does not institute comparisons between his own sensations and those of others, for the purpose of calming his own apprehensions, but in order to excite similar anxiety and distress in others. Lastly, debilitating influences, by discharges, especially of semen, errors in diet, an abuse of medicines, suppressed arthritis, hæmorrhoids and oxaluria, may give rise to hypochondriac affections.

Nosology and diagnosis.—A great error prevails in the ordinary interpretation of the malady, from a misapprehension of the relation existing between the intellect and nutrition. The older physicians distinguished between hypochondria cum materia and hypochondria sine materia, a distinction which is still admitted. The former is considered to depend upon somatic changes, and especially upon disturbances in the organs of digestion and the abdominal circulation, while the latter is stated to be an independent mental affection. No great acumen is required to see the mistake here committed; it results from the history of the disease having been severed, and the successive stages having been treated as distinct conditions. The

[1] Dubois; Ueber das Wesen und die gründliche Heilung der Hypochondrie und Hysterie. Edited, with an Introduction, by Idler; Berlin, 1840, S. 175.

[2] Loc. cit., p. 110.

fundamental trait of hypochondriasis consists in the fact, that the patient's mind moulds itself to corporeal requirements, not in harmony with the ordinary constitution of the individual.[1] From the commencement, vegetative disturbances accompany the derangements of sensation; in proof of this we may mention the various secretions in the stomach, inducing flatulence and pyrosis, which manifest themselves by feelings of oppression and repletion. But the latter symptoms attract so much attention, as to obscure the former altogether, and thus the doctrine of hypochondriasis sine materia is established. When in the course and development of the affection, the organic changes become more prominent, and are rendered visible and palpable, the term hypochondria cum materia is applied. I am not disposed to deny the influence exerted by derangement in the organs of digestion, in causing hypochondriasis, although it is often a mere assumption; but this derangement does not constitute hypochondriasis, even if accompanied by ever such unpleasant sensations and distressing feelings. Hypochondriasis can only be said to exist, if the mind creates new sensations, which, in their turn, give rise to nutritive derangements. Those authors who have adopted the doctrine of material hypochondriasis, have gone so far as to subdivide the subject according to the material agent supposed to be involved, and have attributed distinct influences to black bile and to infarctions. I avoid going more into the details of the subject as too barren.

Diagnostic errors are frequent from psychical hyperæsthesia being confounded with melancholia and hysteria. The characteristic peculiar to the former, as to insanity generally, consists in an alienation of the feeling of identity and consciousness as regards sensations and impressions, and this in melancholia is combined with a tendency to self-negation (negirendem Affect). In hypochondriasis, on the contrary, the egotistic principle is exalted, and in no ways estranged to some other sensation or impression, so as to render this an apparent reality in contradistinction to the essential and true reality. The difference is clearly expressed in all the patient's relations, not excepting

[1] [We have thought it right to attempt a translation of this passage, as containing a quintessential view of our author concerning hypochondriasis, but we are bound to confess our inability to comprehend his real meaning.—Ed.]

his relation to his physician. The hypochondriac looks upon his physician, however often he changes his medical attendant, as his guardian and saviour; while the person labouring under melancholia, treats him as if he were a hostile or ignorant individual, and constantly tries to avoid him.

Hysteria, which some have been tempted to treat as synonymous in females with hypochondriasis in men, presents such distinct characters that I should feel inclined to designate it the only contrast of hypochondriasis. Its chief feature is the preponderance of the reflex actions and sympathetic sensations excited by a definite centre, over the movements and sensation dependent upon impressions. Want of resolution is the characteristic of hysteria; the morale of the patient succumbs, and is under the dominion of the reflex actions. In hypochondriasis the mind is productive, it creates corporeal sensations and changes; the imagination clings to its own productions, and attaches itself to a given group of sensory nerves; whilst sympathetic sensations that fly from one nerve to another, belong to the characteristic symptoms of hysteria.

Course and termination.—Hypochondriasis runs an indolent, chronic course, except when it supervenes at the time of the prevalence of pestilences, or when it has been caused by the bite of animals. The prognosis must depend upon the stage of the disease. So long as no permanent organic lesions have taken place life is not endangered, but it is a difficult matter to establish a cure. When the former are present, their site and degree must determine the proximity or remoteness of the fatal issue. At times a low nervous fever, or tabes nervosa, closes the life of an hypochondriac. Metastases into other diseases occur, in which case we generally meet with diseases of the circulating system, such as hæmatemesis, hæmorrhoids, melæna, and of the organs secreting mucus; it may also pass into arthritis, in which case the hypochondriasis may be superseded or entirely removed. It is rare to find it terminating in cerebral lesions, insanity, apoplectic and paralytic states, and amaurosis.

One of the most arduous matters the physician has to deal with, is the *treatment* of hypochondriasis; it is easy to devise a plan, but difficult to carry it out, and it fails more frequently from want of perseverance on the part of the medical man than of the patient.

First of all we must guard against forfeiting the confidence of the sufferer by the unnecessary and unmeaning assurance that his troubles are based in his imagination only. The sensations of the patient are imaginary, but he transfers them from the mind to his body. In perception it makes no difference whether the irritation takes place at the central or peripheral termination of the fibre, and whether it is induced by directing the attention to it or by a mechanical, chemical, or organic cause. The physician should always be able to appreciate his patient's feelings, and show that he is acquainted with them, without either ridiculing and blaming him, or offering him flattery and sympathising verbosity. The friends of the patient should also be properly instructed how to behave, for they are not unfrequently at fault when the treatment fails. Unregulated and exaggerated sympathy is as injurious as cold unamiable reasoning.

There is another warning which is equally important; we must avoid putting ourselves forward as violent reformers. The patient has become the slave of his sensations, and is morbidly sensitive to every trifle that affects his weal or woe, and it cannot be expected that he should sever himself at once from what he looks upon as dearly bought experience.

The next point demanding attention in the treatment is the stage at which the hypochondriasis is brought before us; we must determine whether it is simply hyperæsthesia, or whether an advanced trophoneurosis has already been developed. The object of the psychical treatment must be to take off the patient's attention from the sensations, and to direct it to intellectual and physical activity. The rank and education of the patient must determine our choice of the means to be adopted. Thus the luxurious lounger should be recommended to take an active part in politics, in parish matters, or in attending to the poor; the student of metaphysics should direct his attention to the study of the natural sciences, or of astronomy. It is futile to require the entire abandonment of a business or profession; this may be recommended in books, but is impracticable in reality, and would be useless even if it were feasible; for a continued attention to impressions might be followed by insanity. The best means of giving the patient a physical impulse, is to induce him to acquire some mechanical

accomplishment. Billiards, fencing, gymnastics, playing upon some musical instrument, afford amusement, and may be adopted according to the taste of the individual. But however well the selection may be made, the bodily regimen must not be neglected; in hypochondriasis, in which the mind seems, as it were, absorbed into the body, the body deserves full attention. An alternation of rest and activity is demanded, and even the species of rest and activity should be varied. Pedestrian tours, and sojourning in beautiful mountain scenery, riding, swimming, driving, sailing, shooting, are appropriate means of diverting the patient. It is desirable that the periods of sleeping and waking should be properly divided; that the former should not be too prolonged, and the bedroom cool. The diet must be of a simple character. Generally speaking coffee and tea are objectionable; for the former we may substitute cocoa or burnt rye. As beverages, wine and water, and a light, well-fermented malt liquor, may be recommended. Flatulent articles of diet, and suppers are to be avoided, while the evacuations are effectually promoted by the use of cold water enemata.[1] We must not overlook the question of sexual intercourse; the hypochondriac is inclined to over-indulgence in this point, and requires to be cautiously warned. There is a species of hypochondriasis, however, in which I advise sexual indulgence; it is that which depends upon a conviction of impotency, and with which I have seen young men afflicted who were on the eve of marriage. In such cases I prescribe, *pro forma*, a powder containing a few grains of lignum santali and sugar to be taken for a week or more, and advise that the attempt be then repeated; I have rarely heard that my remedy failed. Frequent seminal discharges, which often act as an exciting cause of the malady, must be combated by cold sponging of the perinæum and the neck, by

[1] The following anecdote, told of the 'spirituel' Doctor Marcus Herz, illustrates how we may occasionally relieve the painful anxiety of an hypochondriac. The doctor had advised a patient of this description to drink chocolade instead of coffee, to promote his daily evacuation, and to take it between two glasses of cold water which he has been in the habit of drinking. This system agreed well with him. One morning Dr. Herz was summoned hastily. He found the patient in alarm, as he had on that occasion forgotten his first glass of water. Allow me to recommend you, rejoined the doctor with affected seriousness, to take an enema of cold water; you will then put the chocolade in the middle. The patient's fears were calmed, and he could not find words enough to praise the doctor's ingenuity.

hard mattresses, and the avoidance of much drink, bread, and the like at supper. Spermatorrhœa, to which not unfrequently hypochondriasis is to be attributed, requires special attention; and if all other remedies fail we must have recourse to cauterisation of the urethra, which has a moral as well as a physical effect, by withdrawing the patient's attention from his malady.

In the *medicinal* treatment of the first stage of hypochondriasis we must avoid everything that is unnecessary. This rule affords the advantage that the resources are not too soon exhausted; an event which the patient speedily perceives and punishes by a withdrawal of his confidence. The therapeutic treatment must be adopted with a view to two points. In the first instance we must remove the functional derangements of nutrition which supervene with the sensations, and calm the sensations themselves if they become too vivid; in the second we have to attack the organs themselves, in order to produce a change in the system and thus to withdraw the mind from its attention to the sensory impressions. The former is commonly considered a palliative, the latter a radical proceeding. The following functional disturbances, which accompany the sensations, deserve especial attention. 1. Flatulence. The first request of the hypochondriac is to supply him with carminatives; the more powerfully explosive the remedy, the more rapidly his confidence is secured. Besides the usual remedies, (mistura oleo-balsamica, oleum carui, æther, asafœtida,) cold is very effectual, in the shape of cold water with a few drops of acetic ether, as confectioner's ice or ice pills. 2. Abnormal secretion of hydrochloric acid in the stomach, pyrosis, acid eructations. After magnesia usta and liquor ammoniæ, we can advise bitters, as quassia and trifolium, but especially fresh ox gall combined with aqua menthæ pip. 3. Obstinate constipation, the difficulty of finding mild laxatives that have a permanent action, is very great. The most appropriate is the solamen hypochondriacorum Kleinii;[1] and if there is no ten-

[1] [The following is Klein's recipe:—

℞. Sulphur. Precipit., ℈ij;
Rad. Rhei, ℥j;
Cort. Aurant.; Magn. Carb., āā, ℥jss;
Potass. Tart.; Elœosacch. fœnic, āā, ℥iij.
M. S. ter die cochleare minus sumend.—Ed.]

dency to piles or other hæmorrhages, aloes by itself, or in combination with other remedies, thus

℞. Elect. Lenit., ℥j;
Elixir. Proprietatis Paracelsi,[1] ʒj.
M. Sumat ʒj—ʒij, sub nocte;

or in Heim's formula:

℞. Ext. Aloës c. Acid. Sulph. corr., ʒj;
Syr. Balsam., ℥j.
M. Sumat cochlear, or minus.

Colocynth is a good remedy in doses of from a quarter to one third of a grain.

When it is desirable to calm troublesome sensations, soporifics must be avoided; opium generally disagrees with hypochondriacs. When there is too much anxiety and palpitation, I have often seen instantaneous relief following the exhibition of from six to eight drops of tincture of digitalis; for vertigo and hyperæsthesia of the special senses, the acids, elixir acidum Halleri, the elixir vitrioli Mynsichti,[2] in combination with bitters, are appropriate.

The radical treatment must have reference to the constitution of the patient, the condition of his vascular system, the causes that have preceded the indolent or irritative debility; and thus attempt to change or repair the physical state of the individual. There is one class of remedial agents, which unites all the points essential to the treatment of an hypochondriac, affecting his mental faculties, his regimen, and including medicinal agents, viz., the medicinal waters. It is necessary to select the place to be visited, conscientiously according to the requirements of each case. If irritative debility prevails, Ems is indicated; if the constitution is torpid, Gastein, chloride of sodium baths, and the seaside should be recommended. If exhausting discharges have preceded, Driburg, Franzensbad, Spa, and Pyrmont are suitable; if the activity of the intestinal glands is impaired, and arthritis is

[1] [A compound of Aloes and Myrrh., āā, 4;
Saffron, 2; Dilute Sulph. Acid., 4;
Spirits of Wine, 55.
Dose: A teaspoonful, frequently repeated.—Ed.]

[2] [A compound of 1 part of Concentrated Sulphuric Acid to 24 of Aromatic Tincture. Dose from 20 to 30 drops.—Ed.]

lying dormant, Carlsbad and Marienbad should be chosen. After going carefully through a course of waters and bathing, a journey should be undertaken. If the circumstances of the patient do not allow of the adoption of a plan like this, the artificial mineral waters may be substituted with advantage. The drugs that have acquired the greatest reputation are the so-called solvents and laxatives, but their employment has probably been so generally sanctioned without considering that their effect must rather be to afford temporary relief only, than to obtain a permanent cure. They are very appropriate if the patient be plethoric, and have a tendency to hepatic derangement; we may then prescribe tamarind whey, a grape cure, the recent juices of herbs, with acetate or bitartrate of potass, and even Kempf's enemata,[1] due regard being had to the special demands of the case. Under opposite circumstances, however, these remedies, though they afford some relief when contrasted with others, produce no permanent benefit. We may then have recourse to tonics, among which I prefer the preparations of iron. At the same time we must avoid carrying this remedy too far, as it will, in that case, increase the sufferings of the patient. The most appropriate form in which it may be given is the mineral water of Spa, taken in doses of from one to two wine-glassfuls the first thing in the morning; it may be continued for months or years. Taken in these moderate doses it rarely arrests the action of the bowels; but where it is the case, we must aid them with Stahl's aperient pills[2] and similar remedies. The ethereal tinctures of iron rarely agree, but the tincture of muriate of iron answers as well. Besides the use of iron, we have found a continued and regular employment of a bitter tonic beneficial, such as an infusion of herba trifolii fibr. or quassia taken morning and afternoon, in doses of a teacupful. I have obtained no results from the

[1] [The enema viscerale Kempfii contains Valerian and several bitter and aromatic ingredients.—Ed.]

[2] [Stahl's aperient pills:—

℞. Ferri Pulverati, ℈ss;
Pulv. Aloës, ℈ij;
Extr. Colocynth., ℈j;
Mucil. Mimos., q. s.
Ut fiant pilulæ, xl.—Ed.]

use of the nervine remedies, as valerian; &c. these and similar medicines may frequently be tolerated, and this circumstance is differently interpreted. There is a simple and powerful agent, cold, which even in the fashionable exaggeration of the water cure exhibits very marked results.

It happens very often that hypochondriacal patients consult us after they have gone through several systems of treatment, and have consumed a whole shopful of medicines, the recipes for which they present for examination in a roll of papers. In these cases, contrast is the most effectual; the patient may be allowed rest while we order some trifling placebo for his satisfaction, a proceeding which has been long known, but which in modern times has gained notoriety by being decorated with the fool's cap of homœopathy. In the second stage of hypochondriasis we must continue the dietetic treatment, regulated according to the strength of the patient; the other indications must depend upon the nature and seat of the organic affection.

CHAPTER XVIII.

ANÆSTHESIA.

Anæsthesia implies a diminution or loss of the energy of a sensory nerve from its excitability or condensing power being reduced or destroyed.

It is thus distinguished as a disease from the state in which the sensibility has not been called into play or is undeveloped, as well as from that in which the activity of the nerve and sensation are temporarily suspended. The optic nerve may serve as an example: in strabismus its functions are not exercised; in cataract and glaucoma it is prevented reacting upon the application of external stimuli; in amaurosis it is extinct, and cannot be called into play either by external or internal stimulation. These different conditions have not, as yet, been separated from one another, as they deserve to be, although in an anthropological point of view, the perfection assumed to exist in the nervous apparatus, appears to be a subject of profound interest, and in pathology the distinction between undeveloped and impeded nervous functions from such as are incapable of being excited is very important. I shall have occasion frequently to return to this subject, in speaking of the neurosis of motility and of logoneuroses.

It is of no less importance to be well acquainted with the normal condition of the sensory functions, in order that we may be able to form a correct judgment as to their diminutions. Professor E. H. Weber[1] has given excellent directions for this purpose, in reference to the sense of touch, and the sensation of warmth. His investigations, which may serve medical men as a pattern for observation, prove that the consciousness of the distance between two points of a pair of compasses placed upon the skin, varies very much at different parts of the surface. Thus to mention the extremes, we find that at the volar surface

[1] De pulsu, resorptione, auditu et tactu, annotationes anatomicæ et physiologicæ; Lipsiæ, 1834.

of the last phalanx of the finger, two impressions are received by the two points of the compasses when separated one line; at the tip of the tongue the distance need only be half a line; while in the middle of the thigh, a distance of thirty lines is required for the same purpose. The hairy scalp is the dullest part about the head, though more sensitive than the neck; in the face the acuteness of sensation diminishes with the distance from the mouth and the mesial line. The chin and the external surface of the lip are distinguished by their delicacy of touch. The dorsal surface of the hand and the foot is much duller than the volar and plantar surfaces. In the same way the acuteness of taste varies according to the different parts of the tongue.[1]

The capability of appreciating temperature also varies in health. One of the most remarkable instances of this is, that the majority of people receive an impression of greater warmth or cold from bodies touched with the left than with the right hand. The greater the surface of the skin, which comes into contact with the warm body, the more warmth is abstracted and the hotter the latter appears. This may be easily illustrated by dipping the entire hand into one vessel, and into another only one finger, the temperature of the water in both instances being the same. Even if the water into which the right hand is immersed is raised one or two degrees, the water will appear warmer to the left hand.[2] The different conducting power of bodies for physical warmth also comes into consideration; the same thermometric temperature operates more powerfully, and is felt warmer, if it is conveyed by water than by air. Cold water also appears colder than air of the same temperature, because the water abstracts warmth more rapidly from our body.[3] There are differences in the acuteness of the tactile sensation of the skin, which depend upon age. I have frequently seen old men, who exhibited no feeling, or but very trifling signs of sensation, when their faces were pricked. All these points deserve attention; and in symmetrical organs, a comparison of the two is necessary, in order to form an accurate opinion about Anæsthesia.

[1] See the Chapter on Ageustia.

[2] Weber; loc. cit., p. 119.

[3] Müller; Elements of Physiology, translated by Dr. Baly, vol. ii, p. 1328.

Anæsthesia manifests itself in different ways, according to the specific functions of the sensory nerve affected. The division of the subject, which is identical with that of hyperæsthesia, is determined by this relation. The laws of isolated conduction and of eccentric action, must be made the foundation for our diagnosis. By the latter we are enabled to explain a phenomenon which cannot be interpreted in any other way, —it is the occurrence of activity in a nerve which has lost the power of conducting sensations; when met with in a cutaneous nerve of sensation, it is termed *anæsthesia dolorosa* The sensitive fibre is, as we have had occasion to show in the introduction, capable of being excited by an irritant, throughout its entire length, from its periphery to its central termination; but at whatever part the irritation is applied, the impression is referred to the peripheral end, as distinctly shown in the case of limbs that have been amputated, and have therefore ceased to have any relation to the individual. If there is anything to prevent the conduction of sensation, as a tumour seated in the nerve, the distal end of the nerve will be unexcitable, while its central end will be capable of receiving impressions, according to the well-known law of centripetal action. Whatever may be the source of irritation operating on the cerebral side of the tumour, whether the blood, the process of inflammation, or that of softening, the sensation will be referred to the peripheral terminations, though these are actually anæsthetic. In the cutaneous nerves this sensation frequently has the character of formication.

The mutual relations existing between nerves endowed with different functions, attract our attention in anæsthesia as well as in hyperæsthesia; in fact, they become the more interesting, as the negative condition causes most of the phenomena to appear with sharper outlines.

1. *There is an indubitable connection between the nerves of sensation and the nerves of special sense.*—When the lingual branch of the fifth pair is affected with anæsthesia, the sense of taste is unimpaired on the paralysed side of the tongue. Majendie asserts, that in his vivisections he found that division of the fifth pair within the cranium caused diminution and loss of the optical and acoustic functions. Amaurosis is commonly associated with anæsthesia of the ciliary nerves, so that the eye

becomes insusceptible to the irritant influence of the sunbeams; in the same way anæsthesia of the meatus auditorius is conjoined with deafness.

2. *There is a manifest connection between the nerves of sensation and motion.*—Whoever has seen the twitch applied to a horse, has had the best opportunity of convincing himself of this relation; in order to secure immobility of the animal during operations or experiments, sensitive parts, such as the upper lip or the nose, are forcibly compressed, and the most violent movements cease at once. Reflex movements are peculiarly liable to be interrupted by breaking the conducting power of the nerves, and anæsthesia affords a means of clearly distinguishing the movements resulting from reflex action or from mental impulse. I have a patient suffering from anæsthesia of the left trigeminus, in whom rough handling, and even pricking of the bulb of the eye, does not cause winking, but who is able to close her eyes firmly when I ask her to do so. When the anæsthesia affects the vagus, there is no cough. It ought not to be overlooked, that other sensory nerves may conduct the irritation originating the reflex action.

3. *The relation existing between nerves of sensation and of nutrition is frequently manifested in anæsthesia.*—In the first place, the protection afforded to the surface by cutaneous sensibility is lost, and, in consequence, the vessels, *e. g.* of the eye, are permanently exposed to noxious influences and excoriations, and ulcers may arise from continued pressure; but a more immediate relation is exhibited by the retardation and disturbance of the circulation by the exudations of a serous, albuminous, or sanguineous character, and lastly, by defective nutrition. Illustrative instances of this occur in the following descriptions of the varieties of anæsthesia. Recent investigations and experiments have paved the way to a physiological interpretation of the phenomena. It affords me pleasure to refer to the results of a series of accurate experiments instituted by my talented pupil, Dr. Axmann.[1] The division of cerebro-spinal nerves at those points of their course, where new elements join, that originate in spinal and sympathetic ganglia, has demonstrated the influence that these fibres exert upon

[1] De Gangliorum Systematis Structura Penitiori ejusque Functionibus. — Diss. Inaug.; Berolin. 1847.

nutrition. This is not affected if, in a living frog, the spinal nerves, *e. g.* those destined for the lower extremities, are divided between the spinal cord and the spinal ganglion; anæsthesia and paralysis alone result in this case. If the point of section be between the spinal ganglion and the communicating branch, we find, in addition to paralysis and loss of sensation, the following changes: pallor of the skin, partial desquamation of the epidermis, softening and friability of the tissues, especially of the muscles, minute extravasations of blood, and œdema. If the sciatic nerve is divided below the point at which the fibres of the communicating branch, or, in other words, sympathetic elements, are introduced into it, we find, in addition to the symptoms first mentioned, disturbances in the circulation, which are distinctly manifested in the web of the foot. The circulation is rendered indolent and irregular; the dilated vessels are overcharged with blood corpuscles, and in a few vessels the blood is arrested. Twenty-four hours later the circulation is accelerated; from six to twelve hours after that, it again is retarded and intermittent. All the vessels of the posterior extremity then fill even to the finest capillaries, as if a most successful injection had been made. Dr. Axmann has ingeniously instituted some comparative experiments, by selecting different points of division on the nerves of the two sides of the body, and by thus demonstrating the difference in the symptoms in the same animal.

4. The relation of the central organs of the nervous system, which, in the normal state, determines the two species of perception, the one of which we become conscious through the agency of the brain (cerebral); the other, of which we are unconscious, and which acts through the spinal cord (spinal), is well marked in anæsthesia. Cases occur in which the sensory conduction to the brain is interrupted at some point, while it continues to the spinal cord below it, and is manifested by reflex movements. The legs of paraplegic patients contract, and the head is passed over the leg, cold water is sprinkled upon it or the sole tickled, although the individual is not conscious of the sensation, and does not even feel the prick of a needle. (See the description of anæsthesia of the spinal cord.) On the other hand, cerebral conduction may persist, although from an obstacle to perception a pause may be induced in sensation;

this we meet with in epileptic and other diseased conditions accompanied by unconsciousness.

The great discovery of the effects of the inhalation of ether and chloroform, which affords mankind and the brute creation the merciful dispensation from pain during operative proceedings, has produced valuable results with regard to the study of anæsthesia; it has served to place some of the relations first described in a more definite light. We now possess an agent, which, by being directly applied to an exposed nerve, as well as by inhalation or by injection into the rectum, is at all times capable of arresting sensibility in the peripheral and central nervous apparatus, provided the saturation be complete. All those tracts which previous experiments upon living animals had proved to be destined for the conduction of sensibility, lose, during the continuance of the narcotic effects of the inhalation, every susceptibility for irritation; they are the fibres of those spinal nerves that are provided with spinal ganglia, and of the fifth pair, the posterior division of the spinal cord and the medulla oblongata, and the inferior layers of the pons Varolii and the corpora quadrigemina.[1] Nor is the influence confined to conscious sensibility, but it affects also that range of actions of which we are unconscious, and is classed among the category of reflex phenomena; this is evidenced by the absence of blinking when the conjunctiva is irritated, and by the non-occurrence of deglutition when the pharynx is irritated. Conduction takes place indolently in the cerebro-spinal system, and is apparently at a stand still, as the relaxation of the muscles, which so much facilitates the reduction of dislocations, seems to prove; but it is by no means totally suspended; it continues to be subject to the will, and whilst mechanical and chemical irritants are able to produce but a trifling reaction, and to give rise to a gentle tremor, the electric shock exerts its full power. In the sympathic system the motor activity continues energetic, during the influence of stimuli; of this we have a demonstration in the contractions of the heart, in the peristaltic action of the intestines, and in the throes of the etherised parturient female. The respiratory movements, the stimulus for which is

[1] See Flourens, in Comptes rendus, February, 1847; and Longet, Expériences relatives aux effets de l'Inhalation de l'Ether Sulfurique sur le Système Nerveux Paris, 1847, p. 8.

kept up by the medulla oblongata, continues uninterrupted. The energies of the brain and the nerves of special sense, occupy a different relation to anæsthesia. During the condition produced by anæsthetic agents, consciousness and the activity of the senses are generally in abeyance, and there may be utter vacuity, or there are dreams of a pleasing or even an ecstatic character. Not unfrequently, especially if the inhalation be imperfectly conducted, mere intoxication without anæsthesia is produced; the pain may then be felt, as shown by the groaning and screaming, and occasionally, by the violent movements of the patient, but he is not distinctly conscious of them, nor does he remember them.

There are several other points of considerable physiological value in the consideration of anæsthesia. Anæsthesia affords irrefragable proof that sensitive nerves never act vicariously for one another; this fact manifestly controverts the assertions to the contrary, which are so complacently put forth by the soi-disant animal-magnetisers.

In our remarks on hyperæsthesia we have mentioned that in health, sensation continues even during the time that the sensory nerve is not irritated, because it continues in a state of permanent activity without any impulse beyond that constantly exerted upon it by the living interchange of the different constituents of the organism. In anæsthesia consciousness perceives and appreciates the negative state; thus, in the cutaneous surface, we have a sensation of numbness or deadness, which is distinct from the feeling of rest; its manifestations vary according to the peculiarity of the nerve,—in the optic nerve it shows itself as an impression of darkness, in the acoustic of silence, and so on; the manifestation itself requires the continuance of a certain, though a very low, degree of activity. If the irritability and conductility be lost, the sense of rest ceases, and this characteristic may be employed to distinguish the inexcitability of the sensory nerve from the mere temporary cessation of its activity. The sense of darkness in cataract patients differs materially from the spot occupying the field of vision of an amaurotic individual. (See the Chapter on Anæsthesia Optica.)

If we turn from these physiological considerations to the pathological view of anæsthesia, we observe, with regret, that it

is one of those doctrines that have been hitherto much neglected, and therefore is full of defects and imperfections. We merely offer fragmentary information in the following pages, and look to future researches for greater completeness and a more comprehensive point of view.

The treatment cannot be otherwise than meagre under such circumstances. The assumption of nervous debility has often served the physician as an excuse for avoiding reflection, and has been an easy refuge, though the reliance upon nervine remedies has been often doomed to disappointment, for almost all these remedies only stimulate and increase the nervous excitement, without allaying the irritability and giving strength. The following remarks of Müller[1] are very applicable to the subject under consideration. He says: "The nervous force is only increased by the same processes by which it is constantly being reproduced, viz., the constant reproduction of all parts from the whole organism, and of the whole organism by assimilation. Gentle stimuli are, therefore, of advantage to a debilitated portion of the nervous system, not because they exalt the excitability, for they are unable to do it, but because an excited part makes a greater claim upon the restorative power of the whole, and is therefore sooner reproduced and restored."[2]

[1] Müller; Handbuch der Physiologie, vol. i, p. 633, 3d ed.; p. 608, 2d ed.

[2] [This passage is omitted in Dr. Baly's Translation.—Ed.]

CHAPTER XIX.

ANÆSTHESIA OF THE CUTANEOUS NERVES.[1]

The characteristic symptom of this variety of anæsthesia, is diminution or loss of the normal tactile sense of the skin, in its simple or modified condition.

A state of incomplete anæsthesia has recently been observed, which offers much interest; it is the continuance of tactile sensation combined with anæsthesia in regard to pain. In one of the last operations performed by my late friend Professor Dieffenbach, the extirpation of a nasal polypus, the patient, who was etherised, continued conscious; and in reply to my inquiries about the pain he was suffering, stated that he merely felt the dragging and tearing of the forceps as the moving about of a wooden rod in the nostrils. At the same time he held his head erect, and sat firmly on his chair. In his Treatise on Etherisation,[2] Dieffenbach alludes to this as a most striking phenomenon, that the patient should feel no pain, and yet feel the operation. Such insensibility to pain, with a continuance of the sense of touch, occurs in various diseases, but most frequently in lead poisoning, and not rarely in hysteria, but never in cases where the sense of touch is destroyed.[3]

In order to determine the existence and the extent of the cutaneous anæsthesia, it is not sufficient, as has been the prevailing custom, to rest satisfied with the statements of the patient, and with his vague accounts of numbness, deadness, &c.; the degrees and limits of the anæsthesia must be measured with the point of the needle. The examination must be conducted while the eyes of the patient are closed, both in order to be secure against simulation, as well in order to prevent

[1] Romberg; Ueber Anæsthesie, in Wochenschr. für die gesammte Heilkunde, 1839, Nos. 11, 19, and 20.

[2] Der Æther gegen den Schmerz, 1847, p. 61.

[3] See Beau, Recherches Cliniques sur l'Anesthésie, suivies de quelques considérations physiologiques sur la Sensibilité, in Arch. Gén. de Méd., Jan., 1848, pp. 1—24.

the psychical impression caused by the sight of the instrument with which the pain is to be produced.

Cutaneous anæsthesia gives rise to a diminution or a loss of the sense of warmth and cold, as well as of tactile sensation. English physicians have published a few accurate observations on the change of the sense of temperature in anæsthesia. In one case in which anæsthesia had affected the feet half up the calves and the hands, the patient experienced no feeling of temperature when brought into contact with solid bodies, not even if ice was applied; water at every temperature appeared luke warm. Another patient, himself a physician, (Dr. Vieusseux, of Geneva,) whose right side was anæsthetic, called hot things that were applied to it cold, or lukewarm, and cold things hot. When lying in a cold bed, it seemed hot to the right side and cold to the left. In a hot bath the water appeared hot to the left side, and neither hot nor cold to the right. Very cold water produced a sense of warmth on the right side. If he touched a substance which was neither hard nor polished, such as the hand of a friend, he was unable to determine its temperature, and he was forced to call in the aid of the left hand.[1]

The nutritive functions are impaired in the parts affected with cutaneous anæsthesia.

The development of caloric is diminished. Ollivier gives the case of a man who, after a fall upon his back, suffered from anæsthesia of his right side, and retained paralysis of motion of the left side. Three months after the accident the temperature of the right side was $1\frac{1}{2}°$ Reaumur, (about $3\frac{1}{2}°$ F.,) lower than that of the left side.[2] Earle examined the temperature of the paralysed parts in a girl, in whom five years previously he had excised a portion of the ulnar nerve on account of obstinate neuralgia. The temperature of the room was 55° Fahr. The little finger was colder than the rest of the hand; at the dorsal surface of the base of the little finger the thermometer was 56° Fahr.; in the cleft between the ring finger and the little finger it was 57°; at the radial surface of

[1] Traité des Maladies de la moëlle épinière, 3d ed., vol. i, p. 509.

[2] See Marcet; History of a singular Nervous or Paralytic Affection, attended with anomalous Morbid Sensations, Med.-Chir. Trans., vol. ii, p. 247.—Yelloly; History of a Case of Anæsthesia, ibid., vol. iii, p. 90.—Earle; Cases and Observations illustrating the influence of the Nervous System in regulating Animal Heat, ibid., vol. vii, p. 173.

the index 60°; and between the index and the thumb, and in the hollow of the hand, 62°. In another case, in which a fracture of the clavicle had induced complete paralysis of the left arm, the following determinations of temperature were obtained:

Paralytic Arm	Hand. . .	71° Fahr.	Healthy Arm	Hand . . .	92° Fahr.
	Arm . . .	80° „		Arm . . .	95° „
	Armpit . .	92° „		Armpit . .	96° „

Another phenomenon regarding the question of temperature, is characteristic of anæsthesia of the cutaneous nerves, and has not met with due attention hitherto; it is the inability of the affected part to preserve its own temperature in opposition to the temperature of the surrounding media. The equilibrium with the external temperature is so rapidly established, that degrees of heat or cold, which are well borne by healthy parts, are injurious to the anæsthetic regions. In the girl alluded to above, suffering from anæsthesia of the ulnar nerve, the occurrence of frosty weather always gave rise to blistering and ulceration of the little finger; the same took place if she washed the teacups in warm water when the weather was cold, though the temperature of the water was agreeable to the other parts of the hand. The patient with the fractured clavicle introduced his arm into warm malt, and held it there for half an hour, having previously ascertained, with the sound hand, that the temperature was agreeable. On withdrawing the former the whole hand was covered with a blister, and eschars had formed on the tips of the fingers. This hand was always disposed to be instantly affected by the temperature of the surrounding medium. Yelloly relates the same of his patient; for even while sitting before the fire, the knee of the affected side became vesicated, though the clothes were uninjured. Dieffenbach[1] has remarked the same tendency in portions of the face that had been replaced by plastic surgery. As soon as they fully recovered their tone and sensibility they were capable of enduring extreme cold, but large vesications formed on a young nose after a single walk in the open air. Nor is temperature the only agency the power of resisting which is

[1] Chirurg. Erfahrungen, besonders über die Wiederherstellung zerstörter Theile des menschlichen Körpers nach neuen Methoden, vol. i, p. 188.

destroyed by anæsthesia; every external influence, such as mechanical pressure, is met with a similar want of power; of this we have an evidence in decubitus. Thus bedsores of the sacrum are rapidly induced in injuries or diseases of the spinal cord accompanied by anæsthesia; in the same way as sloughs occur on the lower extremity of animals after division of the sciatic nerve.

The circulation is more or less deranged in the small vessels; it is generally retarded, and thus the parts assume a livid hue. The fingers of a patient of mine who, in consequence of a cerebral affection, has been attacked by anæsthesia of both hands, are constantly, in hot weather and cold, of a bluish red colour. Extravasations of serum, albumen, and the colouring matter of the blood, are not unfrequent. Sir Benjamin Brodie adverts to two cases of division of the ulnar nerve by external injury; in one the little finger was cold, insensible, and covered with purple blotches; in the other, the finger every now and then assumed a purple hue; a large bladder then formed, followed by a superficial ulcer, which healed with the formation of a fresh cuticle.[1] Albuminous exudation and subsequent suppuration, hæmorrhage from the nostrils and the oral cavity, occur in anæsthesia resulting from disorganisation of the roots of the fifth pair and its ganglion. Anæsthesia is occasionally accompanied by œdema.

The horny tissues suffer most from the abnormal state of nutrition. There is increased branny or scaly desquamation of the epidermis, accompanied by absence of transpiration on the legs of paraplegic patients. The nails curve in, become rough and ragged, and fall off. Dr. Steinrück, after dividing the infra-orbital nerve in rabbits, observed the whiskers fall off. Sometimes the bones of parts that are subject to pressure become necrosed.

The following case presents several of the phenomena just adverted to, in a very marked degree.

A woman, 50 years of age, had for ten years suffered from violent pains in the right foot, chiefly confined to the vicinity of the outer ankle, the back of the foot, and the toes. At the outer and posterior side of the thigh, at about its middle, a tumour of above five inches in circumference was observed,

[1] Lectures illustrative of certain local Nervous Affections; London, 1837, p. 73.

which was also painful; it was tender to the touch and on pressure, which at the same time augmented the pain in the parts of the foot mentioned. In the course of time the pains increased in intensity, continuing day and night, so that the patient resolved upon following Professor Dieffenbach's advice, to have the tumour removed, which he had recognised as a neuroma.[1] I myself saw the patient a couple of weeks after the operation, in the month of April, 1836. There was complete anæsthesia in all those parts which are supplied by the peronæus and tibialis nerves, whereas the parts supplied from the sciatic above its division, and by the cutaneous branches of the crural nerve, preserved their sensibility. Thus we were able to determine the boundary of the sciatic and crural nerves on the dorsum of the foot accurately with a pin. In the vicinity of the inner malleolus the patient experienced vivid pain from the prick, for there was no interruption to the course of the saphenus internus nerve; at the middle of the dorsum and at the external malleolus, which are supplied by the cutaneous branches of the tibial and peroneal nerves, the insertion of the needle at any depth caused no sensation. The motility of the leg closely resembled the state of the extremity in animals

[1] The following is the accurate analysis of the tumour made at the time by Dr. Remak:—

"It presented an oval shape of about five inches in its long diameter, and was closely invested by the tense and firm neurilemma, excepting at the points of exit of the nerve fibres. On one side, one could see faintly, through the neurilemma, the majority of the nervous fibres separated from one another by the tumour. On dividing the external neurilemmatous sheath, the nerve fibres which were externally uninjured, were entirely surrounded by a scirrhous mass; the tumour was invested by several membranous layers, which became coarser and more parenchymatous towards the interior, and among which a few isolated nerve fibres could be seen to pass. The tumour itself consisted of two portions separated by a layer of membrane; the smaller of these was of a globular form, and attached to the more oval, larger one, at its thickest extremity, and a little to one side. The majority of the nerve fibres occupied the upper layer of the larger portion, and only the few fibres passing through the membranes reached the smaller portion; but here they had entirely lost their neurilemma, so that the ultimate fibrils were exposed, and presented a greyish appearance. Both portions exhibited the structure peculiar to scirrhus, a light-coloured cortical and a grey medullary substance with white shining fibres. The larger one presented a cavity in its interior of spongy texture and traversed by fibrous trabeculæ, and filled with a yellowish-green serous fluid. The smaller one was solid throughout. The primitive fibrils of the nerves presented a peculiar disorganisation, such as is occasionally found in nerves that are partially destroyed, and

after the division of the sciatic in the thigh. The muscles of the leg and foot only were paralysed, and the patient continued able to move the leg, as the muscles of the thigh were unaffected. Decubitus appeared early at the heel. The ulcerated part discharged a thin, sanious fluid, was painless, presented no inflammatory reaction, was pale and easily sphacelated; it resembled the wounds described by Schröder van der Kolk,[1] as occurring on the leg of a dog after the division of the sciatic and crural nerves. Soon after the nails exfoliated. Three years after I again saw the patient, who came to meet me without the assistance of crutches. She rested upon the external edge of the right foot, which thus presented the appearance of a varus; the inner edge being turned upwards, and the sole of the foot being directed inwards. In addition to the former ulceration on the heel, which still continued, a second one had formed at the external edge of the foot near the ankle, from which necrosed portions of bone, from time to time, exfoliated. The epidermis of the dorsum of the foot and of a portion of the leg constantly desquamated, and was discharged in scales like those of psoriasis. The colour of the skin in the dorsum of the foot was dark red and shining. It was remarkable that the temperature of the paralysed foot was higher than that of the

which in this case, as the preparation was fresh, might well be attributed to the long-continued mechanical influence exerted by the tumour. Almost all the medullary tubes presented the appearance of a series of funnels inserted into one another. The varicose tubes were unaffected. The common neurilemma consisted of cellular tissue and a few vessels. In the subsequent layers the vascular network was found to have increased, and in addition to the cellular tissue there was a peculiar variety of fibres; in the vicinity of the solid scirrhus there were round granular bodies, like those found in the grey substance of the brain, and caudate translucent bodies, resembling the corpuscles seen in the nerves of the embryo. The solid substance consisted of a considerable vascular network, the fibres mentioned, and an abundant quantity of the corpuscles spoken of, which, in the grey substance, entirely displaced the fibres, and were also found swimming about in the cavity.

"It follows that (excepting the neurilemma) the sheaths did not essentially differ from the scirrhous mass. The grey hue of the innermost layer resulted from the predominance of the granules and the comparative absence of fibres. The liquid might be merely the product of decomposition of the growing mass, proceeding from within outwards. A secreting serous surface, as seen in encysted tumours, was not to be found. The preparation just described has been placed in the Museum of the Berlin University."

[1] Observat. Anatom. Pathol., p. 14.

opposite extremity; it was 25° R. (88¼° F.,) at the outer ankle, and on the corresponding point of the healthy foot the thermometer showed 24° R. (86° F.) In the interval between the third and fourth toe of the paralysed foot the temperature was 24° R. (86° F.) at the same point of the healthy foot it was 23° R. (83¾° F.)[1] No emaciation had ensued. The anæsthesia continued in the same degree in which I had observed it during the first weeks after the removal of the neuroma. The patient's description of her painful sensations in the anæsthetic parts, given in reply to my questions, was interesting; they obeyed the law of eccentricity like the sensations occurring after amputations. An accidental pressure of the thigh, for instance, against the edge of a chair, caused a sense of numbness and formication in the toes and the foot. At the commencement there were frequent pains, which rarely occurred afterwards, though the patient seemed occasionally to feel her foot in walking.

In cutaneous anæsthesia, the patient, as we have seen in the case just related, frequently complains of numbness, pricking, and formication, and sometimes of vivid pains.

The symptoms are modified according as the anæsthesia is seated in the peripheral or the central organs of the nervous system. When due to a central affection, the anæsthesia is rarely confined to a few tracts, and it is accompanied by a derangement of motility. If it has a peripheral origin, nutrition is the more likely to become impaired, if the ganglionic system is implicated.

Of centric anæsthesia, and especially of that form which occurs as the main symptom in a species of lepra, the indigenous spedalskhed of Norway, we shall treat under the head of spinal anæsthesia. Peripheral cutaneous anæsthesia occurs most frequently by solution, in the continuity of nerves by external injury or surgical operations, by continued pressure exerted by neighbouring organs, (glands, uterus, intestines,) tumours, (of the neurilemma, of bones, vessels, tubercle or fungus,)

[1] In a carefully observed case of anæsthesia of the fifth pair on the right side, described by Dr. Franz von Meyer (Jena, 1847,) in a dissertation, of which we shall have occasion to take further notice, the temperature of the anæsthetic side of the face was throughout from 1°—1½° Reau. (2½°—4° Fahr.) higher than that of the opposite side.

extravasations, or by disorganising processes and inflammation; in the last instance, painful sensations commonly precede. Heat and cold have occasionally been observed to cause the affection. In order to elucidate this subject, Weber has instituted a series of admirable experiments upon himself, the following results of which are of sufficient importance to justify their introduction in the words of the illustrious physiologist.[1]

1. If the terminations of the lingual nerve be exposed to a warm temperature of 41° R. (124° F.), or to one approaching freezing point, they lose for a short time the faculty of distinguishing gustatory impressions. 2. The same agencies destroy the power of the organs of touch, to distinguish between heat and cold, and they also diminish the capacity for distinguishing between various degrees of pressure. 3. The application of cold to the trunk of the ulnar nerve (by dipping the elbow into a pulp made of pounded ice and water), does not produce a feeling of cold either in the nerve or its terminations, but the impression of a pain, in no way resembling cold. 4. The application, however, deprives the terminations of the nerve of its capability of distinguishing between heat and cold, or renders it very obtuse; the member is reduced to a state resembling that which is vernacularly termed going to sleep, and is caused by pressure, acting upon a nerve supplying the part.

The rheumatic causes, which so frequently cause an interruption of the conducting power of the facial nerve in the face, but rarely exerts a similar influence upon the fifth pair. Among the causes of cutaneous anæsthesia, with which recent research has made us acquainted, we must not omit æther, chloroform, and lead poisoning. I have drawn attention to a special cause of cutaneous anæsthesia, in the Clinical Notes published by me in 1846. The subjects were all washerwomen; they complained of an annoying sensation of numbness in both hands and forearms, with which, not unfrequently, a pricking sensation in the tips of the fingers, like that of going to sleep, was combined. Motility was unimpaired, but sensibility had suffered much, as the portion that was numbed only imperfectly perceived the pricks of needles, and in some there was utter insensibility. In

[1] Ueber den Einfluss der Erwärmung und Erkältung der Nerven auf ihr Leitungsvermögen, in Müller's Archiv., &c., 1847, p. 315.

two cases, in which the radial nerve was chiefly affected, there were violent pains spreading along the radial side of the forearm to the thumb, index, and middle finger. This anæsthesia of the cutaneous nerves of the forearm is undoubtedly to be attributed to the occupation of the patients; it is owing to the influence of the ley upon the sensory nerves of the hand and forearm. It is not unfrequent; it deserves the more attention, when we recollect the effect of the ley upon the nutritive system, known under the name of psoriasis lavatricum.

A relation which has not been as yet explained, though of importance, exists between cutaneous anæsthesia, and the interrupted state of the circulation accompanying arteritis; on this subject some remarks will be found in the first chapter, treating of Acineses. The disease generally runs a chronic course, and its type is of a continuous character.

In forming our prognosis, we must take into consideration the seat and cause of the malady, and the secondary affections. If we trace the affection to a centric origin, life is in peril; among the peripheral causes, a simple solution of continuity, as an incised wound, is the most favorable, the supervention of disturbances in the nutritive functions is a source of alarm, and may induce the loss of the affected part. Among the consecutive conditions, decubitus is to be most feared. When the anæsthesia coexists with paralysis of motility, the former generally disappears sooner than the last; in our experiments upon living animals, the conduction of sensation is sooner restored than that of motion.

The natural process of the cure of anæsthesia cutanea is capable of physiological and anatomical demonstration, and most clearly so, when peripheral nerves have been injured. That department of surgery which the genius of Dieffenbach has contributed so much to develop in every direction, the reparation of lost parts, presents the most favorable opportunity for obtaining physiological proofs. Dieffenbach[1] states, that as far as we are able to test the existence of the nervous power, by irritation, pinching, or fresh incision, in the flap of skin brought down from the forehead, to which it remains attached by a mere pedicle, for the formation of a new nose, it has entirely ceased. The first trace of sensation occurs at the

[1] Chirurgische Erfahrungen, &c., vol. ii, pp. 176—184.

boundary between the flap and the part from which it was removed, and on the bridge it is yet very trifling. Several months after the complete cicatrisation of the cut surfaces, a dull sensation is developed in the transplanted flap, commencing at the edges. The feeling of pain resulting from the prick of a pin is undefined and obtuse at the circumference, and as yet nothing is felt at a distance from the edges. The patient, however, forms a tolerably correct judgment as to the locality of the injury, though it is not as accurate as if applied to perfectly sound parts. We cannot call it anything but a pleasantry on the part of Lisfranc, when he states that a prick in the nose formed from the skin of the forehead, is referred by the patient to the forehead.[1] The tip of the new nose does not acquire perfect sensibility for a long time, often not for an entire year; and it is not until this is the case, that it resembles the surrounding skin in regard to its other functions. The nose then perspires, and if wounded, secretes a laudable pus, a circumstance from which we may conclude that perfect innervation is essential to the formation of pus.

Dr. Steinrück has recently given a complete anatomical demonstration of the natural process of cure of traumatic anæsthesia cutanea, in his excellent dissertation.[2] By the aid of the microscope, he has not only succeeded in proving most positively, that a regeneration of the primitive fibrils of the nerves is effected, but he has also shown the transition of single fibrils from the fasciculi of the cicatrix in the fasciculi of the nerve itself.[3] In all cases but one, the conduction of sensation was restored, as the nervous fibres were replaced, but anæsthesia remained in those cases in which the cicatrix consisted of cellular tissue only.

Extravasations of an albuminous or other character, that

[1] Although Professor Dieffenbach had a fund of experience at his command, such as possessed by no other contemporary, Lisfranc's statement is applicable to some cases; I had occasion to verify it in a patient in whom Dr. Berend had formed a nose from a frontal flap. Six weeks after the operation, when the nose was pricked, while the patient closed his eyes, he repeatedly referred to his forehead as the seat of pain. No previous experiments had been made upon him, a circumstance which enhances the value of my observation.

[2] De Nervorum Regeneratione; Berolin. 1838.

[3] Loc. cit., tab. ii, figs. 5, 6, 7.

have taken place at the base of the brain, or in the spinal cord, may be absorbed.

The period in which the conduction of sensation may be re-established after a peripheral injury cannot be absolutely fixed, it varies from four weeks to three or four years and more; in some cases it is never entirely recovered.

The *treatment* of anæsthesia cutanea has hitherto been superficial in the literal sense of the word. Inunctions and cataplasms are often lauded as curative agents where the result ought more justly to be attributed solely to the powers of nature. We may anticipate some advance to be made in future, as our knowledge of the seat and the causes of the diseases develope. We must direct our attention to the vascular system here as well as in hyperæsthesia, the more so if an inflammatory condition has preceded. In such a case the local abstraction of blood, especially by means of cupping, applied as closely as possible to the seat of the malady, is indicated. Various remedies may be employed in order to remove any source of compression; discutants are proper if we have to deal with enlarged glands, evacuants if we have to combat intestinal accumulations. When we have attended to the etiological indications, we are not to expect an immediate return of complete cutaneous sensibility; for that purpose a return of the irritability is necessary, and this may be promoted by stimulants and restorative treatment. Under this head we must first mention dry or moist friction; it should be carried in a centripetal direction, so as to correspond with that of sensory conduction. The application of heat is also valuable, by approximation to the fire, or the application of moxæ (not carried to such an extent as to induce suppuration) of steam, spirituous liquids, hot baths, the baths of Gastein, or animal baths.[1] The natural warmth of the body should be kept up and promoted by covering the parts with bad conductors of heat, as leather or plasters. We may try the application of fermenting substances, as malt or sour krout; nor are we to refuse the assistance of magnetism, electricity, or galvanism, (galvano-puncture,) and we may expect good effects from regularly applied vibrations or concussions of the affected part.

[1] [Animal baths consist in introducing diseased members into the bodies of animals recently killed, that still retain their warmth.—Ed.]

CHAPTER XX.

ANÆSTHESIA OF THE FIFTH PAIR.

Experiments.—Division of the fifth pair in a living animal is followed by insensibility of the face, of the eye, the nostrils, the cavity of the mouth and the tongue; and it will be partial or general according to whether separate branches or the entire trunk has been divided. Fodéra and Herbert Mayo were the first to make the section within the cranial cavity in 1822.

Division of the fifth pair within the cranial cavity produces, in addition to anæsthesia, phenomena of a different character in the range of nutrition, of motility, and the functions of the special senses.

The effect upon nutrition is most rapidly perceptible after division of the ganglion Casseri. It manifests itself most visibly in the eye, and has been described by Magendie,[1] and still more carefully by Valentin.[2] In the rabbit the following results are noticed: sixteen hours after the division or contusion of the fifth pair within the cranium, there is considerable injection of the surface of the eye, which is deprived of its sensibility. After twenty-four hours there is opacity of the cornea; after thirty-eight hours an exudation on the middle of the cornea shows itself. After sixty-two hours the centre of the cornea presents a milky opacity with intense congestion of the vessels of the iris and conjunctiva. After eighty hours we meet with a copious secretion of a viscid purulent fluid, which agglutinates the eyelids. After one hundred and four hours, the pus and the opacity of the cornea have increased so far as entirely to conceal the iris. One hundred and twenty-eight hours after the operation the blennorrhœa has ceased, an ulcer three lines in diameter has

[1] De l'influence de la cinquième paire de Nerfs sur la Nutrition et les Fonctions de l'Œil, in Journ. de Physiol. expér. et Pathol., vol. iv, p. 176.

[2] De Functionibus Nervor. Cerebral., p. 157, not. v.

formed on the surface of the cornea and the anterior chamber is filled with white exudation matter. Twenty-four hours later the congestion is found to have continued, the ulcer is enlarged and covered with a dry yellowish crust. One hundred and seventy-six hours after the division there is considerable reddening of the conjunctiva and increase of the hypossion. After death the cornea is found staphylomatous, the anterior chamber filled with exudative matter, found under the microscope to contain granular and pus corpuscles, and the fibres of the cornea are opaque. The lens, the retina, and the other parts of the eye retain their normal condition. In dogs Magendie has observed, in addition to the above symptoms, rupture of the cornea, discharge of the fluids of the eye, and contraction of the bulb; the corresponding half of the tongue has become brown, fissured, and dry, and the gums are spongy and bleeding. The teeth become loose, and fall out, as do the whiskers. In animals that are tenacious of life, as the batrachian reptiles, the soft parts of the face become detached in gangrenous patches, as in spontaneous gangrene. After three or four weeks one half of the face only remains.

The movements of the face are arrested at the side of the face on which the trigeminus has been divided. We have already stated that the reflex actions are those which are mainly impaired. The pupil is immovable; in rabbits it is permanently contracted; in dogs it is dilated.[1]

Magendie states that the winking of the eyelids and the alternate dilatation and contraction of the ala nasi ceases. The tongue lies immovably between the teeth of the upper and lower jaw. The arrest of motion is still more marked when both trigemini have been divided. The animal waggles its dull head as if it were a foreign body, and its gait is tottering.

The sensual function of the organ is impaired as well as the motility, when there is anæsthesia of the nerves of sensation appertaining to the organs of sense. This derangement is most distinctly manifested in regard to taste, to which point I shall have occasion again to revert; next in the sense of smell, less in regard to sight, and least of all in hearing. Moreover the derangement of nutrition exerts an undeniable influence, especially in the eye, upon the diminution and loss

[1] Valentin, loc. cit., p. 23.

of the special function; the assumption of a direct influence, as taught by Magendie at one time, scarcely requires to be formally disproved in the present state of our knowledge.

The experience afforded by surgery and pathology essentially coincides with the result above detailed.

1. Peripheral Anæsthesia of the Fifth pair—The physiological test of this affection is the isolated loss of conduction on the side of the lesion.

The diagnostic symptoms differ according as the disease affects different portions of the fifth nerve, whether in the face or in its passage, through the sphenoid bone, or in the ganglion Casseri, or at the base of the brain.

a. The more the anæsthesia is confined to single filaments of the trigeminus, the more peripheral the seat of the cause will be found to be.

This variety is most frequently illustrated by external injury of the face. A woman of sixty-three years of age was under my care at one time, who had, four years previously, suffered from a considerable abscess in the vicinity of the left ear, which left a large, deep, ragged cicatrix over the articulation of the lower jaw, and another in the vicinity of the stylo-mastoid foramen. There was complete paralysis of the left facial nerve, with anæsthesia of the superficial temporal branch of the third division of the fifth. The neighbourhood of the parotid gland, the external ear, and the skin of the left temple, were wholly insensible to deep pricking with a needle, whilst sensation in the forehead and cheek remained unimpaired. Sir C. Bell[1] has published several instances of anæsthesia of the ophthalmic, in which the surface of the eye was entirely deprived of its sensibility. The existence of partial anæsthesia is often unknown to the patient himself until accidently discovered, as, for instance, from the tumbler appearing broken at the edge when he drinks. We meet with a few cases of this description in Bell's works. In one the extraction of a lower molar destroyed sensation in the corresponding half of the nether lip. The patient did not feel portions of his victuals or his beverages that adhered to the part after his meals, and when he applied a glass of water to his mouth, he was surprised that the servant

[1] The Nervous System of the Human Body, 3d ed., p. 338, et passim.

had given him one that was broken. There could be no doubt that the mental nerve which issues from the foramen of the inferior maxilla, and is distributed to the nether lip, had been injured at the point where it passes under the teeth. In another case, a female, suffering from carcinoma mammæ, was more distressed by the insensibility of the nether lip than by any of her other symptoms. She had first discovered it by not feeling more than one half of a tumbler in drinking. When the nether lip was touched, it proved to be insensible throughout the distribution of the mental nerve. Sir Charles Bell on passing his finger deep down under the angle of the jaw, discovered a hard glandular tumour attached to the ascending ramus of the inferior maxilla; this undoubtedly compressed the branch of the trigeminus which enters at the inner foramen of the jaw.

b. If the loss of sensation affects a portion of the facial surface, together with the corresponding facial cavity, the disease may be assumed to involve the sensory fibres of the fifth pair before they separate to be distributed to their respective destinations; in other words, a main division must be affected before or after its passage through the cranium.

If it is the first branch of the fifth, the surface of the eyeball is anæsthetic. In the course of 1836, I presented a patient to the students attending my lectures, the left side of whose forehead and the corresponding eyeball could be pressed and punctured without causing any sensation. When the second branch is involved, the nasal nerves lose their functions, and we then find that not only the sensibility to external contact of the nostrils, for instance, by introducing a pointed body, is lost, but that also pungent odours or snuff cause no impression. At page 12 of my 'Klinische Ergebnisse,' a case of this kind is detailed. The patient, a watchman in a private house of business, was required to spend his nights in a hall, where the left side of his face was exposed to a slight but constant draught. In consequence of this he soon experienced violent pains in the left side of the face, upon which anæsthesia supervened, and this induced the patient to apply for relief as an out-patient. On examining the face the second branch of the left trigeminus proved to be the nerve affected; the cheek, the left half of the nose, and the corresponding nostril, as well as the mucous

membrane of the mouth, and the gums of this side were entirely anæsthetic. Deep punctures with needles, applied to these parts, were not felt at all, whilst if the skin, which is supplied by the first and third branches, was slightly pricked, the patient gave marked symptoms of sensibility.

The movements of the left side of the face could be executed, but they were in a measure limited, as appeared when the attempt at a snuffling movement of the alæ nasi was made. At the same time the patient complained of occasional lancinating pains in the anæsthetic side of the face. The eye often wept, the nostril was dry, and together with the gums of the affected side, presented a great tendency to hæmorrhage. The patient stated expressly that the anæsthetic cheek assumed a livid hue when exposed to the cold, and then contrasted strangely with the normal colour of the healthy cheek. It deserves to be mentioned that there was a tumefaction of the left os nasi, which was said to have shown itself coincidently with the violent pains of the left half of the face. The history of the case rendered it probable that the complaint took its origin in rheumatism. On this assumption the iodide of potassium was ordered in solution in doses of five grains four times a day; at the same time an ointment containing the same substance was rubbed into the anæsthetic parts. Three weeks from the commencement of treatment the lancinating pains in the anæsthetic side had disappeared; sensibility had returned in the skin of the nose and the cheek, and the upper lip was the only part in which any traces of anæsthesia remained. Treatment was continued, and these also ceased after a time.

When the conducting power of the third branch is impaired, the corresponding half of the tongue is found to have lost its sensibility. To avoid repetition the reader is referred to the cases detailed in the section treating of anæsthesia of the gustatory nerve.

c. When the entire sensory tract of the fifth nerve has lost its sensation, and there are at the same time derangements of the nutritive functions in the affected parts, the Casserian ganglion, or the nerve in its immediate vicinity, is the seat of the disease.

In addition to insensibility in the external and internal surfaces of the face, the following symptoms present themselves·

the eye inflames, suppurates, ulcerates, and becomes atrophied; the cavities of the nostrils and the mouth are reddened, there is hæmorrhage, and the gums are soddened.

Herbert Mayo was the first to communicate a case of this kind in his anatomical and physiological commentaries, published in 1822; he was followed by Serres,[1] who has described an instance of this important form of anæsthesia, and accompanied it by an account of the post-mortem appearances. It is as follows:

A man, æt. 26, who was subject to epileptic fits, suffered from chronic inflammation of the right eye. In December, 1823, an acute inflammation supervened, accompanied by œdema of the eyelids and opacity of the cornea. A seton was applied, in consequence of which the ophthalmia disappeared, but the cornea remained thickened and opaque throughout. In the following January and February the right eye was observed to be insensible to touch. In June the right nostril and the right half of the tongue were proved to be anæsthetic. Between the 15th and 20th of June, the gums of the right side inflamed, first in the upper jaw and then in the lower; a scorbutic condition was developed, which, in the month of August, extended to the left side, though in a lower degree. A careful examination now yielded the following results: if the right eye was rubbed with a feather the patient had no sensation, and did not even blink. The inner surface of the eyelids was equally insensible. When the left eye was thus treated, the usual reaction occurred. The right nostril was insensible to the application of a feather; spirits of ammonia only caused a trifling impression, though the application of the smelling bottle to the left nostril could scarcely be borne. The patient could not taste the disulphate of quinine when applied to the right side of the tongue, while he tasted its bitterness on the left side. The gums on the right side had become detached from the teeth, which were loosened. The post-mortem examination, which was made in the presence of Magendie and Georget, showed the ganglion Casseri of the right side to be diseased, of a greyish yellow colour, tumefied and reddened, and congested at the point at which the ophthalmic division passed off. The three divisions participated in this change of colour and struc-

[1] Magendie; Journal de Physiologie Expérimentale, V, 233. 1825.

ture, as far as their respective exits from the skull, the inferior maxillary branch being more affected than the superior. The lesser, motor portion of the fifth, was normal in its entire distribution.

Gama, in his Traité des plaies de tête et de l'Encéphalite (Paris, 1830, p. 173,) communicates a case of which the following is an abstract:

A military man, who was affected with paraplegia, had for about nine months complained of a gradual loss of sensation in the right half of his face, and of vision in the corresponding eye. He felt that he did not masticate equally well on both sides, and had adopted the habit of not carrying the food to the right side of the mouth. He often asked for an acid gargle in order to render the gums harder. The amaurotic eye did not differ much from the healthy organ in lustre or size. The pupil was rigid in the most powerful light. Handling the conjunctiva or the cornea conveyed no sensation to the patient. He felt no pain when the cheek, the forehead, or any part of the right half of the face, was pinched, but sensation was not utterly gone. He would remark that this side of the face was dead, but that he could distinguish between a mere touch and a pinch. The feather of a quill even could be introduced and twisted about in the right nostril without exciting any sensation. Smell and taste were unimpaired; the patient asserted that he perceived no difference between the two sides of the tongue. The sensibility of the tongue was unimpaired on both sides, whereas that of the oral mucous membrane, was totally destroyed on the right side. The muscles of mastication of the right side were paralysed. The mouth was drawn to the left side. After death the origin of the trigeminus was found to be yellow, softened, atrophic, and deprived of its white matter. The ganglion Casseri was much enlarged, and presented the appearance and consistency of bacon. The nerve fibres, which are generally traceable through the ganglion, were entirely fused with it. The first branch of the fifth and its ramifications were reddened, as if congested, and adhered closely to the tendinous sheath within the orbit. The inferior maxillary branch appeared normal after its issue from the maxillary foramen. The superior maxillary was most altered, being thickened, tough, and steatomatous like the

ganglion; several of its fibres had increased considerably in bulk. The right optic nerve before the chiasma was only a quarter the size of the left one; it was softened, of a pale reddish colour, mucous consistency, and deprived of its medulla. The retina was also softened, attenuated, brownish, and marbled. Beyond the chiasma no distinct difference between the two optic nerves was perceptible.

Abercrombie[1] relates the following case taken from the practice of his friend Dr. Alison. The patient was affected with anæsthesia of the left side of the face, of the corresponding nostril and eye, with occasional hæmorrhage from the left nostril, and with pain in the anæsthetic parts, accompanied by febricitations. There was frequent inflammation of the left eye, and opacity of the cornea. After a few weeks an inflammatory ring formed round the cornea, which commenced ulcerating, and allowed the humours of the eye to escape. The left maxillary muscles were paralysed, and when the patient masticated or closed his jaws, they felt relaxed. Movement was unimpaired in the other muscles of the face. After the destruction of the eye, the paralytic attacks continued for more than a year; violent headaches then supervened, followed by sopor and death. The sectio cadaveris exhibited extensive softening of the central portions of the brain, and the left trigeminus was found to present a remarkably firm structure in the vicinity of the ganglion Casseri. Behind the ganglion it was atrophied in a marked degree; and when it joined with the pons Varolii, nothing but a membranous structure remained.

Another case[2] is given in which there was a loss of sensation in the left half of the face. Inflammation and ulceration of the bulb then supervened, and the anæsthesia, after six months' duration, ceased. The patient, both before and after these occurrences, suffered from violent headache and epileptic fits.

Since the period at which these cases were published, the literature of the subject has been augmented by similar observations. I have met with several cases in my own practice, and I possess the details of others, for which I am indebted to the kindness of my respected colleagues. The following deserve to be recorded here:

[1] Pathological and Practical Researches, &c., 3d ed., 1836, p. 424.

[2] Loc. cit., p. 425.

Dr. Rigler, the former assistant of Professor Jäger of Vienna, was appointed, in 1843, to superintend the first arrangements and the management of the Military Hospital at Constantinople, and has sent me an account of the malady of a Turkish officer, who, in consequence of a fall from his horse upon the left side of his head, had been deprived of his consciousness for several hours. The man was 28 years of age, of robust constitution, and unimpaired vigour. On recovering his consciousness after the fall, he complained of severe pain in the left half of his head, of photophobia, tinnitus aurium, and drowsiness. These symptoms continued for three months. The treatment was at first powerfully antiphlogistic, and was afterwards confined to the repeated application of leeches, blisters, and the internal administration of small doses of the tartrate of antimony. At the time when Dr. Rigler first saw the patient, he had been free from headache for two months; the conjunctiva of the left eye was of a dark, dusky red, œdematous, and invested with a thin secretion, which fretted the swollen edges of the lids; the lower half of the cornea was rendered opaque by an exudation between its laminæ, there was considerable mydriasis, and a capsulo-lenticular cataract; the functions of the retina were more impaired than is generally the case in such material changes in the eye, and the bulb felt very soft. The affected eye had formerly been as vigorous and active as the right eye continued to be at the time of observation. The patient complained especially of the difference in the complexion of the two sides of the face, the left side being remarkably pale and flabby; he was also distressed by the insensibility of the left half of his mouth, and by the constant state of abrasion of the left concha. A close examination proved the entire left side of the face to be insensible in the whole range of the trigeminus; the eye, the nostril, and the tongue, could be irritated in every possible manner, without producing the slightest impression. The slightest touch caused the Schneiderian and mucous membrane of the nostril and mouth of the left side to bleed. The left anterior and middle portion of the tongue were deprived of the faculty of taste, as proved by the application of powdered quinine, or rhubarb; at the same time the root of the tongue continued in undisturbed possession of its gustatory powers. The ulceration of the external ear depended upon the anæsthesia; for the fess,

a covering of the head constantly worn by the Turks, and pulled down over the ears, had produced no such effects before the fall, although the pressure and friction must have been the same. There were no reflex movements on the left side of the face. An effort of the will brought the muscles of this side into play, but not with the same energy and rapidity with which the movements were exerted on the right half. This is probably the first medical observation, conducted in a spirit of philosophic inquiry, and based upon physiological principles, which has been gathered in the metropolis of the Moslim; and the reader will feel himself equally indebted with me, to Dr. Rigler, for his instructive communication.

The second case is taken from the letter of a former pupil, the present Professor Fenger, of Copenhagen, whose treatise 'De Erysipelate Ambulanti,' has already met with the approbation it merits. An old woman, of 57 years of age, after the removal of the right breast for carcinoma, eight years before coming under Dr. Fenger's observation, had fallen into a cachectic state, accompanied by atrophy and loss of power in the right arm. She had for one year complained of violent pains, at first intermittent but afterwards continuous, on the right side of the face as far as the mesial line. In September, 1841, paralysis of the same side of the face supervened, the pains at the same time continuing as before; sensation was much reduced, yet in some parts there was tenderness on pressure. The right eye projected a little, and could not be rotated outwards. The conjunctiva was much congested, the cornea dull, and its lower portion presented an ulcer of about two lines in circumference. Vision had become impaired before the occurrence of these symptoms. The sense of smell, according to the patient's statement, was entirely destroyed in the right nostril; taste and sensation were abolished in the right half of the tongue. The mouth was drawn upwards and to the left side, the movements of the tongue remaining unimpaired. The action of the masticatory muscle was normal. The progress of the ophthalmia induced perforation of the cornea, and a purulent fluid was discharged from the cavities of the eye. Death supervened suddenly. The post-mortem exhibited the brain and the first four pairs of nerves in a healthy condition. The right ganglion Casseri was much enlarged, having attained the size

of a large hazel-nut, and being thick and indurated. The three branches of the fifth pair of the right side were considerably thickened up to their passage through the sphenoid bone. The upper and anterior part of the pituitary body was converted into a serous cyst; the remaining portion was enlarged into a tumour, to which the abducens was intimately adherent. The dura mater investigating the posterior surface of the petrous portion of the temporal bone was much thickened and degenerated, where it was traversed by the facial and acoustic nerves. Numerous growths of the character of medullary sarcoma were found in the liver and the right ovary.

Our knowledge of the anæsthesia dependent upon disease of the ganglion Casseri, has received valuable contributions by the recent excellent investigations of Norwegian elephantiasis, by Danielssen and Boeck.[1] I shall have occasion to treat of these researches more in detail, when I arrive at the subject of spinal anæsthesia.

d. If the anæsthesia of the fifth nerve is complicated with disturbed functions of adjoining cerebral nerves, it may be assumed that the cause is seated at the base of the brain.

We have now arrived at the last division of the peripheral side of the fifth pair; its morbid conditions also present definite characters. The motor portion of the fifth is generally involved in this case, and we then have paralysis of the masticatory muscles in the corresponding half of the face. The successive affection of other cerebral nerves, be it one or more, the oculomotor, the facial, the acoustic, must depend upon the local extent of the cause. Fungous and tubercular tumours, and sanguineous or albuminous extravasations, are the most frequent causes. The following case, though it had a favorable issue, is an illustration of what we have stated:

In the month of October, 1830, a woman of the lower orders, æt. 69, applied to me, and gave the following account of herself:—a week previously, while scouring a room with the window open, she was suddenly seized with a violent rushing noise in the left ear, and soon after perceived a tumour in the vicinity of the ear, which disappeared after four and twenty hours. The

[1] Traité de la Spédalskhed ou Eléphantiasis des Grecs; Paris, 1848.

[A full analysis of this work is given in the British and Foreign Medico-Chirurg. Review, vol. v, p. 171. 1840.—Ed.]

patient looked as if affected with hemiplegia. On examining the face, I found that the mouth and the tip of the nose were drawn over to the right side, there was ptosis of the left eyelid, the left cheek was flabby and pendulous; she was unable to seize or retain anything with the left side of the mouth, and the saliva ran out at this side. The want of expression on the left side of the face when she conversed, laughed, or cried, was strongly contrasted with the constant movements of the right side; when she attempted to excite the left facial muscles by action, by an effort of the will, she could only produce an effect in the temporal and masseter, which were equally active with their fellows in closing the jaws and in chewing. There was no trace of sensation in the left half of the face, and the anæsthesia was sharply bounded along the mesial line. Pinching and pricking were not felt when applied either to the external or the internal surfaces of the cheek. The left nostril was insensible to titillation and friction with a notched feather, or to the pungent effects of ammonia. The left half of the tongue was deprived of sensation and the power of taste. The left eye was umblyopic, so that all objects appeared surrounded by a dense mist; the pupil was dilated and immovable; the surface of the eye was insensible to the touch. The left ear was capable of hearing, but affected with violent pains, darting up to the forehead and temple. The movements of the tongue and the extremities were unimpaired. At first, blood was abstracted behind the ear, and purgative salts, with small doses of tartar emetic, were exhibited during a few days. I then applied a blister between the mastoid process and the angle of the jaw, and kept up the discharge for six weeks. A fortnight after the commencement of treatment, its beneficial effects manifested themselves; first, in improvement of vision in the left eye, then in the increased mobility of the left angle of the mouth, by which she was enabled to retain the saliva, and discharge it with some vigour; then in the increased facility with which she raised the left eyelid; and lastly, by a return of sensibility in the external and internal surfaces of the mouth; the latter was observed to increase from the circumference inwards. At last, the pain in the ear disappeared, with an accession of febricitations and critical perspirations. In the middle of December, the patient presented herself to me as perfectly cured. The

motility of the left half of the face and its expression was entirely restored, as well as the sensibility of the skin, with the exception of two small spots at the tip of the nose and the chin.

2. Centric Anæsthesia of the Fifth pair.—The physiological characteristic of the affection lies in the crucial effect of the lesion; our diagnosis is established by the coincident affections of other nerves of the face and the trunk, and their loss of sensory and motor power.

In an article contained in Müller's 'Archiv für Anatomie, Physiologie, und wissenschaftliche Medicin,'[1] I have pointed out that this form of anæsthesia is found to accompany recent hæmorrhage in the brain. It affects the third branch of the fifth pair, of the side opposite to that in which the lesion is seated; one half of the chin and the lower lip externally and internally, the inner portion of the concha of the ear, the skin of the temple and the half of the tongue are deprived of their sensibility. In the cases hitherto observed, I have found these symptoms combined with paralysis of the portio minor of the fifth. The patient is affected with paralysis of the muscles of mastication, and is able to chew with the muscles of the opposite side of the face only. At the same time the facial nerve, (generally only the fibres that go to the alæ nasi and the upper lip,) the hypoglossus, and the nerves of the extremities, are involved, so that the disease manifests itself in the shape of more or less complete hemiplegia.

The effect produced is not in a crucial direction, if the disease, *e. g.* a tumour in the central structures, affects the point of insertion of the fifth nerve. This is illustrated by the following case given by Abercrombie:[2] A man attacked by hemiplegia, but not deprived of sensation in the arm and leg of the left side, had lost both sensation and motion in the left half of the face. Sensation was also destroyed in the left half of the tongue; though its power of movement continued unimpaired. The mucous membrane of the left nostril was permanently of a dark red colour, and hæmorrhage often took place from it. The conjunctiva of the left eye was much congested; opacity and ulceration of the cornea then ensued; and finally there was entire disorganisation of the eye. The patient often suffered

[1] 1838, p. 313.

[2] Loc. cit., p. 425.

from erysipelas of the paralysed side of the face. He was deaf on the left ear, and for some time previously he had laboured under headaches. Death ensued two months after the commencement of the paralytic symptoms. Cadaveric inspection showed a tumour in the left half of the pons Varolii, by which the origins of the fifth and seventh pairs were compressed against the cranium. The tumour was of the size of a walnut, of firm texture and a brown colour, and extended into the left crus cerebri.

The phenomena relating to the study of anæsthesia, and occurring in the range of other cutaneous nerves, must be handled in the manner which we have indicated in the preceeding investigation into anæsthesia of the fifth pair. It is necessary constantly to bear in mind, the difference between a centric and peripheral origin. The older authors afford instructive instances; thus Morgagni's[1] works contain one in which a large aneurism of the crural artery had eroded the sciatic nerve to such an extent, that the lower and upper portions were only connected by a few fibres. The entire limb had lost its power of motion and sensation, excepting the tumour itself and the inner malleolus; here the most excruciating pains were felt, which may be accounted for by the fact of the crural nerve, which sends fibres to these parts, having been irritated.

[1] De Sedibus et Causis Morborum, epist. 1, art. 11.

CHAPTER XXI.

ANÆSTHESIA OF THE MUSCULAR NERVES.

The sensory nerves of the muscles, as we have previously shown, possess not only the power of conducting ordinary sensation, but also the peculiar sensation relative to the condition of the muscles, whether of action or of rest. Their morbid states, whether of an hyperæsthetic or anæsthetic character, present a type in accordance with these distinctions. Occasionally the sensibility of a muscle is abolished. Yelloly has described a case of anæsthesia,[1] in which a needle could be introduced into the ball of the thumb, so as to penetrate down to the bone, without causing the patient the slightest sensation.

A loss of the specific muscular sensation, the counterpart to vertigo, the fundamental character of which has been stated to be an impression of illusory movement, may occur in connection with anæsthesia cutanea or isolated. Bell[2] relates a few instances of the former. One of his patients had lost the power of sensation in the eye and eyelids by a tumour which compressed the nerves within the orbit; at the same time motion continued unimpaired in the latter, because the fibres of the facial nerve had not suffered by the compression. The patient was unable to say whether her eyelid was open or closed; but when told to close the eye that was already shut, the orbicularis was seen to act, and she compressed the eyelid forcibly. In another patient the sensibility of one half of the body was found to have become impaired after parturition, without a loss of motor power; she was able to carry the child on this side so long as her attention was directed to it, but as soon as it was drawn off, the flexor muscles gradually relaxed, and the child was in danger of falling. The corresponding nipple was also affected with anæsthesia, though the secretion

[1] Medico-Chirurgical Transact., vol. iii, p. 90.

[2] The Nervous System, &c.

of milk was not less copious on this side than on the other. When the mamma was distended, no pain was felt. She saw the child suck and swallow, but she had no sensation of it, as she experienced when it was put to the opposite breast. On the opposite side sensibility remained normal, while the power of movement was impaired. She was unable to carry the child on her arm; the grasp of the hand was powerless; the leg could only with difficulty be set in motion, and she dragged the limb in walking. Sensation not only continued undiminished on this side, but the patient complained of a permanent sense of heat, painful dragging, and an unusual sensibility to external pressure and slight mechanical injuries.

In considering the nature of such cases, we might be easily induced to attribute the loss of muscular sense to the cutaneous anæsthesia; but Weber's[1] researches have shown that even in health a marked difference exists between the perception of the weight of bodies, according as we judge of it exclusively by sensation or by moving, and raising the weight together with the limbs upon which it rests. In the former case it is not easy to distinguish light bodies from heavy ones. "Observationibus illis probatur, mensionem ponderum solo tactu factam, plus quam duplo subtiliorem reddi, si ad eam perficiendam simul cœnæsthesis musculorum adhibeatur." In morbid states the difference between tactile sensation and the muscular sense is well marked. Thus Ollivier[2] details a case in which the patient had lost the cutaneous sense of touch throughout the right side in consequence of concussion; at the same time he was unable to form a correct estimate of the weight of bodies with his right hand. The physician observed by Marcet, who was affected with anæsthesia cutanea of the right side, was perfectly able to feel his patient's pulse with the fingers of his right hand, and to determine its frequency and force, but in order to determine the temperature of the skin, he was obliged to call in the aid of his left hand.

I have observed that anæsthesia of the muscles alone without loss of tactile power, invariably accompanies tabes dorsalis. A simple experiment suffices to determine the fact. If the patient is told to shut his eyes while in the erect

[1] De Pulsu, Resorptione, Auditu et Tactu, p. 89.

[2] Traité des Maladies de la Moëlle Epinière, 3d ed., vol. i, p. 509.

posture, he immediately begins to move from side to side, and the oscillations soon attain such a pitch that unless supported he falls to the ground. Even if the trunk is supported, if the patient be sitting and leaning against the back of a chair, the phenomenon takes place to the same extent, and he will slip off the chair. From the commencement of the tabes dorsalis, as soon as the motor power becomes diminished, this anæsthesia manifests itself; it becomes more evident as the disease progresses; and it is only towards its termination, when the muscular debility approaches to paralysis, that it can no longer be clearly distinguished. The eyes of such patients are their regulators, or feelers; consequently in the dark, and when amaurosis supervenes, as is not unfrequently the case, their helplessness is extreme. Excepting during the last stage the skin remains sensitive; the complaints of the patients that they feel when they walk or stand as if a soft body, such as a layer of wool, intervened between the ground and the soles of their feet, must consequently be referred to the diminished muscular sense. Similar phenomena occur, though less frequently, in the upper extremities; Bell relates that one of his patients distinctly felt when the fingers of his right hand were touched, but that he had no perception of their position when his eyes were averted, so that he would say they were flexed when they were extended.

The doctrine of muscular anæsthesia affords an explanation of the fall of the body, and it may not be without interest to mention other causes of this occurrence in nervous diseases. I distinguish falling in paralysis, convulsive falls, and falling from loss of the balancing power and of the muscular sense. In the first the individual falls to the side on which the resistance is removed; thus in hemiplegia he falls to the paralysed side. In the second he falls as he is driven by the motor impulse, either forward or backward, or on one side, as in epilepsy; in either the direction of the fall serves for the diagnosis of the seat of the disease, which will be found in the opposite hemisphere of the brain. Lastly, when the sense of equilibrium and the muscular sense is abolished, the fall takes place according to the laws of gravitation.

CHAPTER XXII.

ANÆSTHESIA OF THE VAGUS.

The symptoms differ according to whether the respiratory or gastric branches of the vagus are affected with anæsthesia.

It is well known that all parts of the respiratory apparatus are not endowed with an equal degree of sensibility. The entrance to the respiratory passages, the glottis, and the larynx are the most sensitive; they are protected by the superior laryngeal nerve, the nerve of respiratory instinct bearing the same relation in its sphere as the glosso-pharyngeal does to digestion. We do not possess experimental or pathological illustrations of anæsthesia of the superior laryngeal. I first discovered insensibility of the larynx in the asphyxia occurring in Asiatic cholera, and I determined its existence by attempting to produce cough by acrid vapours, in consequence of observing the uniform absence of cough in this disease.[1] The patients inhaled the vapours of benzoic acid without feeling anything and without cough, while surrounding persons were only able to bear it for a short time, owing to the unpleasant sensation and the constant irritation which it gave rise to. During the epidemic of 1837, I repeated the experiment upon several patients with the same result. I shall not attempt to determine whether the arrest of the circulation in the lungs and of the process of oxygenation, exert any influence in producing this effect; at all events this anæsthesia presents an interesting analogy to the unsonorous voice (vox cholerica), in cholera; and in cases of aphonia we ought not to omit testing the larynx with reference to anæsthesia.

The trachea appears endowed with the lowest degree of sensibility; this is evidenced by the absence of pain in tracheotomy, and in cauterisation of the trachea in croup sub-

[1] See Romberg's Bemerkungen über die Asiatische Cholera, in Hufeland's Journ der Pract. Heilkunde, February, 1832.

sequent to operation, as recommended by Trousseau and others, but justly condemned by the bulk of the profession.

On the other hand, the sensibility of the bronchi, and especially of their ramifications, is indisputable; it manifests itself as pain, oppression, and dyspnœa, and by exciting the reflex action of the medulla oblongata, induces increased action both of the ordinary and the auxiliary muscles of respiration. Anæsthesia of the bronchi may be assumed to exist when we find painful sensations to be absent or to have ceased, though an exciting cause continues, and when the number of respirations is diminished. In proof of the former, Brachet has put forward the results of his experiments;[1] he found that animals, in whom, after division of the vagi, tracheotomy had been performed, breathed as freely under the bell of the air-pump, as if they had been in the open air, and that they died in half or three quarters of an hour without any suffocative attacks; Volkmann[2] however has demonstrated the fallacy and the error of his conclusions. Accurate experimenters agree in the observation that, after division of the two vagi, the number of respirations becomes much reduced. Sir Astley Cooper[3] mentions a case in which the number of respirations sunk from 135 to 48. Arnold[4] has confirmed this; and Traube,[5] who has instituted a series of admirable experiments, fixes the average reduction of the number of respirations in rabbits at two thirds; the average number of respirations of these animals in the recumbent position being $131\frac{1}{6}$; the average number, after division of the vagi, in the same position, $40\frac{1}{4}$.

We very rarely meet with pathological instances in which the peripheral portions of both vagi have lost their power of conducting impressions; and even in the few cases on record,

[1] Recherches Expérimentales sur les fonctions du Système Nerveux ganglionaire, p. 157.

[2] Ueber die Bewegungen des Athmens und Schluckens, mit besondrer Berücksichtigung neurologischer Streitfragen, in Müller's Archiv, &c., 1841, p. 332.

[3] Some Experiments and Observations on Tying the Carotid and Vertebral Arteries and the Pneumogastric, Phrenic, and Sympathetic Nerves, in Guy's Hosp. Reports, vol. i, p. 457.

[4] Bemerkungen über den Bau des Hirns und Rückenmarks, p. 167.

[5] Beiträge zur experimentellen Pathologie und Physiologie; Berlin, 1846, Heft. i, p. 102.

the diminished frequency of respiration has been overlooked. I admit the same defect to exist in the following case, which was contained in the first edition of this work; still the absence of the perception of apnœa is dwelt upon.

On the 10th of May, 1837, I was called to see Otto H—, a child of two years old, who, according to the statement of his parents, had for some weeks been labouring under cough and wheezing respiration. During the last week a peculiar crowing sound had occasionally been heard; and the practitioner who had charge of the patient, assuming the presence of croup, had ordered calomel and leeches. When I saw the child, it was lying in bed; its cheeks were pale and skin cool; there was wheezing respiration, without any manifestation of distress in the face, and a short cough with a crowing sound and no fever. Pressure applied to the larynx and trachea, increased the dyspnœa, but did not increase the cough. No abnormities were elicited by percussion or auscultation. The child bore to have its head and neck raised without apparent inconvenience. Consciousness was unimpaired, and the power of deglutition unaffected. The question whether a membranous or purulent expectoration followed the cough, was negatived. No disposition to throwing the head back was observed, nor was I able to discover any increased action in the alæ nasi, the sterno-cleidomastoid muscles, or the diaphragm.

I evidently had to deal with the termination of an important disease; but the interpretation was difficult, as I had not seen its development. I was most struck by the contradiction between the absence of air and the absence of the perception of its want. I had never before met with anything like this in croup, bronchitis, or diseases of the heart, as long as the patient continued capable of receiving impressions. In croup the great excitement prevailing in all inspiratory muscles has always appeared to me an essential characteristic, and the violent distension of the alæ nasi is, in my opinion, a more trustworthy indication than the sound of the cough. In the case under consideration there were no violent movements of the alæ nasi, of the sterno-cleidomastoidei, or of the diaphragm; though consciousness was unimpaired there was no expression in the features of apnœa, and yet there was no doubt of the fact that the entrance of the air was impeded. Death ensued

four and twenty hours after I had seen the child, with increased rattle in the breathing.

There was no trace of congestion or exudation in the larynx and trachea; the mucous membrane was pale. A moderate quantity of frothy, serous fluid was found in the bronchi and their ramifications, which were traced into the lungs. The lungs contained more of it, and of a reddish colour. Both vagi were surrounded and compressed in the neck by a mass of tumefied lymphatic glands, filled with tubercular matter and pus; and the nerve evidently flattened in some parts. Some of the glands were of the size of small cherries.

The perception of the want of air, the besoin de respirer, only ceases when the conducting power of the two vagi ceases, for interruption, occurring on one side only, is more prone to induce attacks of dyspnœa and asthma, on which subject we shall have occasion to dilate in another part of this work.

Central anæsthesia of the vagus is frequently observed in diseases of the brain, and especially in apoplectic conditions; it is not uncommon in diseases of the lungs that terminate fatally, in which case it manifests itself by the cessation of dyspnœa and of the painful sensations, by diminution of the number of respirations, cessation of the cough, and the arrest of expectoration, although loud mucous râles continue.

We do not possess a sufficient supply of proper observations, either in the domain of pathology or of experimental physiology, to determine the relations of anæsthesia in the gastric branches of the vagi. Possibly it gives rise to the loss of the sense of repletion, when the stomach is filled with aliment; Swan[1] even relates a case in which there was atrophy and disorganisation of both vagi, and the patient never felt his stomach to be filled though he took ever so much food, a condition of insatiability and insensibility which continued to the last; the case does not, however, meet the requirements of philosophical criticism.

[1] A Treatise on Diseases and Injuries of the Nerves; London, 1834.

CHAPTER XXIII.

ANÆSTHESIA OF THE NERVES OF SPECIAL SENSE.

I. OPTIC ANÆSTHESIA.

Amaurosis. Gutta Serena.

Experimental results.—Division of the optic nerve, in the living animal, is painless, and is followed by complete blindness. The pupil which contracts during the act of division, soon after becomes distended. However long life may be prolonged, vision is never restored.[1] Removal of one cerebral hemisphere induces blindness of the eye of the opposite side, the removal of the two hemispheres causes blindness of both eyes, (Flourens.) Amaurosis may be defined to be diminution and loss of vision by anæsthesia of the optic nerve.

The individual affected with it sees objects indistinctly, even when they are lit up by a bright light; they appear surrounded by a fog or mist, and no effort nor the employment of artificial means increases the distinctness. The outlines of objects appear not only indistinct but also broken, and thus disfigured. The flame of the candle appears rent; while reading, the patient misses single syllables, words, and lines, and he is forced to follow them by moving his eye, his head, or his entire body. At times the upper or lower, the right or left half, the circumference or centre of the object only, is seen; at others the loss of vision is still more partial, and is confined to different spots of small extent, and with differently shaped outlines. Instances also occur in which the object is only seen, when it bears a definite relation to the eye, and it vanishes on the slightest movement of the eye or head. The faculty of distinguishing colour is often lost.

When the disease is at this stage, it is termed *amblyopia;* when vision is entirely lost, it is called *amaurosis.*

An attack of amaurosis is often preceded by phenomena of

[1] Valentin; De function. Nerv. Cerebr., p. 12.

optic hyperæsthesia, (photopsia, chromatopsia,) which, in many cases, accompanies the disease when completely developed.[1]

These symptoms of anæsthesia of the optic nerve become complicated with phenomena, which depend upon the sympathetic affection of other nerves in and near the eye. One of these is the impaired mobility and disfigurement of the free edge of the iris. The pupil is rigid, or it may be more or less moveable, contracted, or dilated, round or angular, (vertically or horizontally,) jagged, and elongated. The bulb of the eye deviates from the line of the optic axis, and is almost invariably directed outwards. The vascular system of the eye and its nutrition generally, not unfrequently suffers. Varicosities, changes in the form and consistency of the bulb, and a greenish opaline opacity, are discovered within the eye.

Viewed physiologically, we are able to explain many of the phenomena accompanying optical anæsthesia. In the same way as we explain the pains occurring in anæsthesia cutanea according to the law of eccentric action, we must account for the luminous impressions of the patient after the optic nerve has been deprived of its functions, we must carefully avoid mistaking them for real visual perceptions, though it is an error the patients themselves are apt to indulge in to their own great disappointment.

The immobility of the pupil accompanying amaurosis occasionally, depends upon the interruption of the reflex action, to which the mobility of the free edge of the iris must be referred. One link in the chain, the conducting power of the optic nerve, is broken, and for this reason the reflex impulse cannot be conveyed to the oculomotor nerve. At the same time we must not forget that, in amaurosis of *one* eye, the reflex impression transferred from the healthy eye causes a contraction in the pupil of the diseased eye; for the purposes of diagnosis it is therefore necessary to close the healthy eye when we wish to examine the affected organ. The motor parallelism of the optic nerve, to which Stromeyer and Valentin[2] have directed attention, and upon which the position of the bulb depends, suffers in amaurosis; this causes the deviation from the optic axis.

[1] See the Cases detailed by Dr. Johnson, p. 114.

[2] Loc. cit., p. 20, § 146.

The relation existing in the eye between the nerve of sensation and of special sense, and to which I have already adverted, upon speaking of ciliary neuralgia (p. 56), presents a threefold character in optical anæsthesia. The action of the sensory ciliary nerves, which manifests itself both by sensation and reflex action[1] upon the motor, ciliary, and other nerves, either remains normal, or it is exalted or extinguished. In the former case the reaction to light, and especially the calorific rays, continue to serve as a source of irritation. Valentin[2] mentions a boy, whose case was investigated by Guttentag, who had become amaurotic on both eyes after a nervous fever. The iris remained immovable when the light was admitted, and even when the midday rays were concentrated by a burning glass; but the pupil at once contracted when a lighted candle, or some other heated body, was brought near the eye, so as to cause a flow of tears and congestion of the conjunctiva. Instances of hyperæsthesia of the ciliary nerves, evidenced by painful photophobia, and by the pupil contracting and the eyelids closing, are of rare occurrence in amaurotic patients, but they are met with occasionally. Anæsthesia of the ciliary nerves is a more common accident; the susceptibility to light, as a stimulant of sensation, is, in these cases, entirely extinct, and the blind person may receive the rays of the sun in his eyes without being painfully affected; this phenomenon frequently coexists with glaucoma, and is termed a longing for light, because it is supposed that the blind individual is seeking for light in order to see. Magendie found that he was able to hold a red-hot iron close to the eyes of animals whose fifth pair had been divided within the cranium, without producing any movement of the eyelids; at the same time, if sunbeams impinged upon the eye, the lids closed at once.

Diagnosis.—Optical anæsthesia, as evidenced by a loss of irritability and power of conduction in the optic nerve, should be distinguished from its inaction. Imperfection and weakness of vision are the result of not exercising the optic faculty; in many persons one eye is constantly in this condition, and it is

[1] It is well known that snuffing up cold water into the nostril, or touching the conjunctiva with nitrate of silver, causes the pupil to contract. (Larrey; Clinique Chirurgicale, vol. i, p. 427.)

[2] Loc. cit., p. 13, note 1.

still more the case in an eye affected with strabismus, and therefore amblyopic. If a necessity for exercising the organ arises, as from disease of the opposite eye, the short sightedness soon ceases, at times with extreme rapidity, as we may convince ourselves in the operation introduced by Dieffenbach for strabismus. A greater difficulty presents itself when we have to determine whether the loss of sight is the effect of real anæsthesia, or whether it depends upon an obstacle to the manifestation of the still existing activity of the retina by exudations, opacity of the vitreous humour, &c. I think it worth while to mention a physiological criterium by which this condition may be recognised. The quiescent state of the optic nerve is conveyed to our consciousness as an impression of darkness; when the nerve has lost its conducting power, no sense of its rest or of darkness can continue, whereas it must continue if its action is merely interrupted. We may thus account for the difference in the sensations of blind persons. Some despair on account of the impenetrable night that surrounds them, while others have the advantage of feeling the loss of the optic powers only as a blot in the field of vision. We should also make the experiment of producing the impression of figures, by pressure, in the amaurotic eye, and if we fail in this we may look upon it as a proof that the nerve has lost its excitability.

The nebulous spots or black dots dependent upon partial anæsthesia, are said by Valentin[1] to be distinguishable from those caused by small exudations or varicosities, by continuing as a yellow spot in the subjective luminous images, while the latter disappear.

Amaurosis has a centric or a peripheral origin. Any changes occurring in the course of the optic nerve, from the retina to the insertion into the brain, may give rise to peripheral amaurosis, whether the changes have been developed in the nerve tissue itself, or originate in the surrounding tissues, and thus arrest the conducting power.

The most perfect instance of peripheral amaurosis is presented to us in the traumatic variety.[2] Vision disappears suddenly after the injury, either partially or totally; fiery lightning-like phenomena occur. The expression of the eye is staring,

[1] Loc. cit., p. 16, § 32.

[2] See Jüngken; die Lehre von den Augenkrankheiten, 2d ed., p. 780.

and there is often strabismus. The iris is immovable, the pupil dilated, and generally irregular—it is sometimes drawn so much to one side, that its edge lies close to the edge of the cornea, and at first sight appears totally absent. The injury, whether a concussion, laceration, or bruise, affects the eyeball or its vicinity. Authors dwell particularly upon injury to the supraorbital region, and have assumed a sympathetic relation to exist between the supraorbital and optic nerves. It has been customary to quote Hippocrates in support of the doctrine, that wounds of this region endangered vision; we may particularly refer for the details of this theory to a programme of Platner's: de vulneribus superciliis illatis cur cæcitatem inferant, ad locum Hippocratis, &c. The distinguished ophthalmologist, Beer, did not hesitate to attribute to the affection of the frontal nerve that variety of amaurosis, which occurs some time after the injury, in consequence of defective cicatrisation; he even states, that he has cured two cases of this kind by making deep incisions down to the bone, near the supraorbital foramen, and thus dividing the stretched filaments. But this must have been an error of Beer's. In order to satisfy myself on the subject, I experimented upon a goat several years ago, and applied ligatures to the different supraorbital nerves that issue from several orifices, but no amaurosis ensued, and the animal died some weeks after of softening of the brain. Professor Hertwig had the kindness to repeat the experiment on the 6th of June, 1839, upon a horse in the veterinary school. The supraorbital nerve was exposed on the right side. As often as it was irritated by the lancet, vivid pain was manifested, the evidence of which was starting of the head and a jerk of the entire body. At the same time there was much winking, closing of the eye, and increased lacrymation. The irritation of the nerve exerted no influence upon the retina; it continued to maintain the same position and size, and behaved exactly as the pupil of the left eye. The ligature was subsequently applied at about three lines above the exit of the nerve, and firmly tied. No alteration was perceived either in the powers of vision or in the pupil. For another purpose, the central part of the nerve was touched with chloride of antimony. On the fourth or fifth day, the right eye was half closed, the lower eyelid being much swollen and œdematous; a large quantity of tears was

being constantly secreted, which ran out of the internal angle of the eye, and from the right nostril over the cheek. The pupil was normal. It was evident that vision was unimpaired, for when threatened with a stick from behind, or with the finger before the eye, the animal started; but all movements were heavy, and there was evident stupor, even when the head was held down. On the seventh day, the horse was attacked with violent convulsions, and lay in death throes. Vision was now extinct, and a considerable quantity of thick viscid fluid was discharged from the eye. A few hours after death, Professor Gurlt examined the body. The supraorbital nerve was completely included in the ligature; the portion touched with the butyrum antimonii was mortified, of a grey colour and soft consistency. The nerve was otherwise perfectly normal throughout its course within the cranium, and no morbid appearance was demonstrable either in any other part of the fifth pair or in the brain itself.

I have since discovered that Vicq d'Azyr has instituted similar experiments, induced by his meeting with the case of a young man, in whom the supraorbital nerve was divided by the thrust of a foil, in consequence of which amaurosis gradually supervened. He inflicted every variety of injury upon the nerve in several quadrupeds, but in none of them did blindness ensue; only occasionally twitchings of the eye and increased lacrymal secretion followed.[1]

I cannot conclude, without quoting the statement of my experienced friend, Professor Jüngken, that he never met with anything resembling the instances that Beer speaks of; but that in such cases the amaurosis was exclusively the consequence of a concussion of the eye-ball or of lesion to the brain.[2]

Inflammation of the retina, which rarely occurs in a primary form, but generally in combination with inflammation of other tissues of the eye, is accompanied by the most intense photopsia, which increases in the same ratio as vision becomes impaired. It runs a very rapid course, terminating in from twenty-four to forty-eight hours.

[1] Histoire de la Société Royale de Médecine, Année 1776; Paris, 1779, p. 316.

[2] See von Walther; Ueber die Ciliar Verletzungen und die Amaurose, in v. Gräfe und v. Walther's Journal der Chirurgie und Augenheilkunde, vol. xxxix, p. 505.

At the base of the brain and cranium, the conducting power of the optic nerve is chiefly interrupted by tumours and extravasations; some rare cases are on record, in which it was destroyed by wounds penetrating through the orbit; Larrey has detailed a remarkable instance of this.[1]

"A fusileer of the old Life Guards, while playing with the foils, was wounded in the right eye, by the foil breaking and entering at the inner side of the orbit; it passed under the eyebrow, through the lid, in a slanting direction from the right to the left, and from before backwards. The first symptoms that occurred, were violent pain at the left side of the forehead, numbness of the left half of the body, and slight twitchings of the facial muscles, but without loss of consciousness. Soon after hemiplegia supervened, most marked in the arm, sensation continuing. The pulse was 45, respiration and deglutition were laborious; and the patient had great difficulty in articulating a few words. Obstinate constipation and retention of urine followed, with vertigo on the slightest movement, and inclination to syncope. On the nineteenth day the cerebral symptoms, with the exception of the hemiplegia, abated. While the head was at rest, the patient was only able to see the horizontal half of objects occupying the axis of vision; when they lay to the inner side of the axis, towards the nose, they became gradually developed, so that he could see them entire; but if they lay outwards towards the temple, they disappeared in the same manner. No change, either as to form or motility, was perceptible in the pupil of the affected eye. Death ensued three months after the accident. On dissection, a perforation, three lines in diameter, was found at the inner portion of the orbital plate of the frontal bone in the vicinity of the ethmoid fossa; a thin layer of cortical tissue remained attached to the aperture. The corresponding point of the cerebrum exhibited a similar defect, leading to a canal which took a superficial course towards the inner edge of the right anterior lobe, passing over the olfactory nerve of this side. It penetrated to the extent of two lines into the left hemisphere, crossing the left optic nerve and the root of the right. The latter was injured at its origin, and beneath the anterior cerebral artery, which presented a considerable dilatation at this point. The point of

[1] Clinique Chirurgicale, vol. i, p. 177.

the foil had penetrated to the lower wall of the lateral ventricle, close to the left crus cerebri. The oblique channel was from two and a half to three inches long, lined with a coagulum, but free from pus."

In this case, the amaurosis dimidiata was caused by injury of the external part of the right root of the optic nerve, and proves that the external part of the fibres of the chiasma pass to the eye of the same side; similar effects may be produced by exostoses occurring on the sphenoid bone. I assume this to be the case on both sides in a girl of twelve years affected with epilepsy, in whom the outer half of both eyes has lost its susceptibility to light. In an amaurotic boy, who was attacked with mania a short time before death, Beer found a considerable spicula at the side of the sella turcica, which had penetrated the optic nerves at the chiasma.

The most frequent causes of amaurosis are, sero-albuminous exudations at the base of the brain, compressing the chiasma, and commonly the result of meningitis. The oculomotor nerve, from its close proximity, is generally involved at the same time, so that convulsions or paralysis of the muscles of the eye are found to coexist.

Centric amaurosis is caused by any influence which abolishes the conducting power of the optic fibres within the brain. The accompanying symptoms are such as are attributable to the brain as a central organ; they are cephalalgia, vertigo, sympathetic affections of other organs of sense, psychical derangement, convulsions, (*e. g.* eclampsia parturientium,) especially paralyses of the motor nerves of the eye, the face, the tongue, and the extremities. The eye itself presents no peculiar symptom, except great rigidity and immobility of the iris. The seat of the disorganisation may be in the cerebrum or in the cerebellum,[1] and in either it may occupy various points, the thalami optici or the hemispheres, without any immediate relation to the optic thalami. The rule of crucial conduction is found to prevail; but there are cases on record, in which the eye of the side corresponding to the injury is said to have been amaurotic; this is contradicted by the experiments made upon animals, and is probably to be accounted for by the observer having interpreted changes occurring at the

[1] Andral; Clinique Médic., vol. v, pp. 686 and 737.

base of the brain, and involving the peripheral nerve, as central affections, compressing tumours, softening, extravasation of blood, and the accumulation of serum in the ventricles, are the lesions most frequently met with. In the amaurosis, not unfrequently complicating tabes dorsalis, we find atrophy of the optic nerve of the chiasma and the optic tracts; the thalami optici also may, one or both, be atrophied and otherwise altered in colour and texture.

In addition to the diagnosis of the seat of the affection, we possess an etiological diagnosis for amaurosis, as for diseases of the eye generally, for which we have to thank the laborious researches of celebrated ophthalmologists, and especially of Professor Jüngken. The objective characters of amaurosis caused by congestion, exhausting discharges and tabes, by gastric affections, arthritis, syphilis, &c., have been so extensively described in the works alluded to, that I need not enter into the details of these matters, and shall confine my own remarks to a few points which have met with little attention.

Among the causes predisposing to optical anæsthesia, we have to enumerate hereditary taint, the middle period of life, in the female sex the climacteric, and the development of pigment; amaurosis is rare in grey and blue eyes, as compared with the liability of dark irides. Among the specific substances which suppress the activity both of the ciliary and the optic nerves, we must mention belladonna and hyoscyamus. Lead poisoning, especially by an atmosphere filled with lead dust, occasionally gives rise to amaurosis, either in combination with other nervous affections that precede, or are associated with it, such as colic or saturnine epilepsy, or, though rarely, by itself. It generally supervenes suddenly, runs a rapid course, lasting only a few hours or days; or in exceptional cases, extending over a longer period. Both eyes suffer at the same time, and in an equal or different degree. The pupil is dilated, unequal, variable. Tanquerel des Planches[1] has observed twelve cases of the affection.

The post-mortem examination made of amaurotic patients, agree in the observation of atrophy of the optic nerves.[2] The peculiar corpuscles recently discovered in the retina, by the aid

[1] Traité des Maladies de Plomb, vol. ii, pp. 208—225.

[2] Jos. et Car. Wenzel, de Penitiori Structura Cerebri Hominis et Brutorum, pp. 112—127.

of the microscope, are no longer visible, and the optic nerves are at times reduced to their mere neurilemma. When the atrophy extends as far as the optic thalamus, the latter becomes lower, narrower, flatter, more grey, and loses its medullary tissue; the opposite thalamus, at the same time, may be large and more bulky than in the normal condition.[1] It is important to attend to the relation of the optic nerves anterior to the chiasma, to the tract posterior to it, and to the thalami. All observations coincide in demonstrating a partial decussation. This accounts for the apparent contradiction involved in the different cases, that show that the portion posterior to the chiasma and the thalamus of the same side were affected, while in others the parts of the opposite side, and again in others, both optic nerves posterior to the chiasma, and both thalami, were atrophic. Vrolick, Magendie, and Lelut, have even found the atrophy extending to the corpora quadrigemina.[2] It is difficult to determine whether the atrophy of the nerve is a cause or effect of the anæsthesia. In animals, the mere inaction of the optic nerve, as accompanying opacity of the cornea artificially induced, is rapidly followed by atrophy of the corresponding nerve, anterior to the chiasma,—a circumstance not observed in man. Not long ago, I had an opportunity of examining the optic nerves minutely in an hemiplegic individual, who for nine years had been blind in his right eye from capsulo-lenticular cataract, and there was no atrophy.

With the exception of the variety induced by lead-poisoning, amaurosis is rarely acute; it generally endures for a series of years, for half a life, or more. In several aged amaurotic patients, I have observed obstinate insomnia.

The affection, for the most part, presents a continuous, rarely an intermittent type. Beer has met with one case of amaurosis occurring on every third day, another with a double tertian type. In the former, the amaurosis was complicated with a dull pain in the head and somnolency; in the second, with a distinct glaucomatous disorganisation of the vitreous humour, and violent headache and pain in the eye. In these cases vision, which during the paroxysms was entirely abolished in both eyes, returned in the intervals and in one of the patients;

[1] Meckel; Handbuch der Pathologischen Anatomie, vol. ii, p. 319.

[2] Longet; Anatomie et Physiologie du Système Nerveux, vol. ii, p. 73.

a female, every trace of opacity of the vitreous body disappeared on the free days. Amaurosis has also been observed to occur as a symptom accompanying the paroxysms of ague, associated with intense headache. The anæsthesia of the optic nerve, dependent upon the position of the sun, excites a peculiar interest, and has been termed *cæcitas diurna* and *nocturna*.[1] Vision is diminished, and ceases either with sunrise, and returns towards night, the less frequent case, or it disappears at sunset and is restored at sunrise (*nyctalopia*.) Both eyes are almost always equally affected, but the affection varies in degree. At times, lancinating pains in the limbs precede, which disappear with the commencement of the disease, and show themselves in the eye. The pupils are dilated and indolent, or contracted and irritable. In orphan asylums, the disease sometimes occurs endemically, and at definite seasons; it has also been observed as an epidemic, especially in combination with scurvy. Jüngken has often met with it in boys and girls consequent upon masturbation, and as an accompaniment of hysteria. Cold, malaria, and the exclusive use of coarse vegetable food, have been proved to cause it. Nightblindness occurs in Russia extensively among the poor during Lent.[2]

The *prognosis* is generally very unfavorable. Cases of cure are rare, excepting in saturnine and periodic amaurosis. The only consolation the medical man can offer, is to hold out the prospect that the affection will remain stationary at the stage of amblyopia, if the causes are removeable, and medical aid has been called in sufficiently early. To attain even this, the patience of the physician, as well as of the patient, is greatly taxed. The mind of the patient is distressingly busy in anæsthesia, as we have found it to be in hyperæsthesia of the optic nerve; and while he is growing blind, he is a source of great trouble to

[1] The Greek terms *hemeralopia* and *nyctalopia* are improperly applied by authors; etymologically nyctalopia means nightblindness, and in this sense Bergen has used it in his dissertation 'De nyctalopia s. cæcitate nocturna;' Hemeralopia is a term that does not occur in Greek authors; but if we apply the same rule, it can only mean dayblindness. See Coray's excellent edition of Hippocrates' Περὶ ἀέρων ὑδάτων καὶ τόπων, vol. ii, p. 46.

[It appears that the Germans use the terms differently from British pathologists, who apply nyctalopia, according to its etymological meaning, to night-vision or dayblindness.—Ed.]

[2] Ruete; Lehrbuch der Ophthalmologie, p. 605.

his medical adviser; after he has become blind we find him resigned.

The *treatment* hinges upon the cause, and must also be adapted to the individual constitution of the patient. From this it follows, that the remedies vary, and that the much lauded specifics are fallacious. For the amaurosis originating in lead poisoning, Tanquerel advises the use of drastic purges, the endermic application of strychnine on two small blistered surfaces on the forehead and temple, and electricity. He considers these remedies particularly useful, provided the exciting cause be avoided. In one case which I attended,[1] they all proved useless. The indications for the local treatment of amaurosis, which is too often erroneously based upon the assumption of nervous debility, are as definite as they are for the general treatment. The reader will find a complete exposition of the subject in Jüngken's work,[2] to which I must refer him.

[1] Klinische Ergebnisse, p. 17.

[2] Lehre von den Augenkrankheiten, p. 851, & seqq.

CHAPTER XXIV.

ACOUSTIC ANÆSTHESIA.

This anæsthesia may be defined as the absence or loss of the power of the acoustic nerve, to perceive impulses of solid bodies, or vibrations of the air, as sound, owing to a diminution or loss of the conducting power, or excitability of the acoustic nerve.

The ordinary term deafness and other designations, as surditas, or cophosis, also comprise that hardness of hearing which results from impediments to the physical propagation of the sound waves, owing to diseases of the organ of hearing.

In health, we meet with variations in the perception of sound, which must not be overlooked, if we wish to form a correct estimate of deafness. There are many persons whose hearing generally is good, but whose power of hearing high notes is very limited.[1] The range of hearing differs in different individuals.

In acoustic anæsthesia the loss of hearing generally commences in one ear, gradually and almost imperceptibly; it rarely affects both organs at the same time. At first distant sounds only are indistinctly perceived. There is a difficulty in following a general and animated conversation, the sounds becoming confused. After a time the opposite ear suffers, and the deafness increases. Sooner or later tinnitus aurium supervenes; it is at first indistinct, but as the disease increases, becomes loud and sonorous. This noise not unfrequently extends from the ear to the entire head. Certain circumstances exert an undoubted influence upon the improvement or increase of the affection. It is augmented by mental fatigue, depressing emotions, by damp, stormy, or cold weather, or debilitating discharges; while light-heartedness, a hopeful frame of mind, and a dry mild atmosphere relieve the patient, though but temporarily. The same applies to loud noises in the

[1] Müller's Elements of Physiology, Dr. Baly's edition, vol. ii, p. 1309.

vicinity, *e. g.* driving in a rattling carriage, the ringing of a bell, the beating of a drum, &c. Anæsthesia of the acoustic nerve either remains permanently at this stage, or complete deafness ensues, to such an extent that hearing can no longer be excited by any stimulant. In this case the tinnitus generally ceases.[1]

Some symptoms occurring in the ear itself deserve attention. One is the cessation of the secretion of the wax; the external meatus becomes dry, and the investing epidermis peels off in scales or branny particles, a symptom set down by Itard as a sure sign of deafness from anæsthesia of the acoustic nerve. Kramer has found the membrana tympani to be white as paper, and opaque. The cutaneous sensibility of the skin and its vicinity becomes dull, and may be altogether extinguished. The meatus becomes so insensible to contact that the patient describes his sensations in cleaning the ear, as if he were touching a piece of parchment. The dullness of sensation also extends to the temples and the parotideal region; the patient himself says that these parts feel numbed and dead. Itard has found this insensibility so intense in two individuals, that even incisions made into the cutaneous coverings of the neck were not accompanied by pain.

The *diagnosis* of the deafness caused by anæsthesia of the auditory nerve depends not alone upon the criteria, to which we have just alluded, but is materially aided by some negative symptoms, which we derive from a local investigation, and by acoustic experiments. The meatus when examined by the speculum presents no abnormity. The cavity of the tympanum and the Eustachian tube are free from accumulations. Müller,[2] assuming that hearing the impulses of solid bodies, communicated by solid bodies to the bones of the head, must continue while the labyrinth is sound, proposes that we should avail ourselves of this means in deaf subjects who do not hear atmospheric undulations, in order to determine whether the labyrinth and its auditory nerve is intact. In making the experiment, we must distinguish between the perception of the vibrations

[1] See Itard; Die Krankheiten des Ohrs und des Gehörs; Weimar, 1822, p. 412, &c.—Kramer; Die Erkenntniss und Heilung der Ohrenkrankheiten, 2d ed.; Berlin, 1836, p. 334 & seq.: Dr. J. R. Bennett's translation, p. 256 & seq.

[2] Elements of Physiology, Dr. Baly's translation, vol. ii, p. 1283.

as a tremulous movement and the perception of an acoustic sound. We perceive the vibrations of sounding media as a tremulous motion, by aid of the cutaneous nerves, as we ascertain by laying our hand upon the chest of an individual while speaking; it is probable that the sensory filaments of the fifth nerve that are distributed to the membrana tympani are destined for this purpose. Deaf and dumb persons look round when anybody stamps upon the ground behind them; this fact is available in forensic medicine in cases of simulated deafness, and has been made use of by quacks, such as Mesmer and his school, to induce a belief that they had restored the sense of hearing to deaf persons.[1]

We have yet to advert to the influence exerted by deafness upon other functions. As he is incapable of enjoying the pleasures of society, the deaf person avoids it or rarely seeks it, and this circumstance exerts a marked influence upon his mental faculties. The voice suffers more or less, and rarely retains its pitch. In children speech is generally lost altogether, even if they had acquired it perfectly previously to becoming deaf. Itard has observed that deaf persons are less easily acted upon by purgatives, and are generally less susceptible to medicinal agents.

It has been erroneously stated that the loss of hearing is compensated for by the greater acuteness of another sense; this is never the case.

The *causes* of deafness must be divided into such as destroy the conducting power of the peripheral or of the centric tract of the auditory nerve. Among the former we must enumerate sudden, violent concussions of the acoustic nerve, by loud explosions, thunder, &c., or by concussion of the cranial bones (*e. g.* by a vigorous box on the ear,) injury or laceration accompanying fractures of the cranium, compression by tumours seated in the petrous bone and at the base of the brain. Among the central causes, disorganisation of the brain is the most frequent, whether idiopathic or resulting from destruction of the petrous bone by osseous tubercle. In the cases that have been hitherto placed on record, the cerebellum, though not exclusively affected, has generally been found to be the seat of disease together with the cerebrum.

[1] Rudolphi; Grundriss der Physiologie, vol. ii, p. 148.

It is difficult to determine the seat of acoustic anæsthesia; when peripheral it is commonly confined to one side, and when produced by a tumour at the base of the brain, the deafness is generally accompanied by paralysis of the face. At this moment a patient presents himself to my memory, who, owing to a violent external pressure of the cranium, has retained paralysis of both facial nerves and difficulty of hearing on both ears. Centric deafness is almost invariably associated with anæsthesia of other nerves of sense, especially of the optic nerve, and with paralysis and loss of memory.

Hereditary influences and advanced age afford a predisposition. Kramer states, that in one third of the patients a similar affection may be traced in their parents or brothers and sisters. Sympathetic deafness has often been spoken of, and it is stated to be especially complicated with intestinal affections, but its real existence is not proved. Irregular dentition, whether of the first teeth or of the wisdom teeth, is often accompanied by deafness, as proved by the authority of Nuck, Valsalva, Itard, and Hesse. It frequently occurs during the critical periods of nervous fevers.

The few careful dissections that have been made of the auditory nerve in deafness, have proved that it becomes atrophied in the same manner as the optic nerve in amaurosis.[1]

The prognosis of anæsthesia acoustica is generally unfavorable. The degree and duration of the affection and the age of the patient assist in the determination. It may be laid down as a rule, that there is scarcely any prospect of improvement when the disease has become so far developed, that the ticking of a watch, which a healthy ear hears at a distance of thirty feet,[2] is scarcely, or not at all, heard when applied to the affected ear.

The longer the malady has endured, especially after the application of searching remedies, the less hope exists. The prospect is most favorable in persons under twenty years. The deafness of advanced age is incurable.

The treatment hitherto pursued has been confused and unsatisfactory. From not possessing positive data, physicians

[1] See Lincke; Handbuch der Theoretischen und Praktischen Ohrenheilkunde, vol. i, pp. 591 and 641; Leipsig, 1837.

[2] Kramer, loc. cit., p. 347.

lost patience and interest in the matter, and charlatanism therefore appropriated this class of diseases with bold audacity. We may, therefore, congratulate the profession upon the endeavour that has been recently made to discover indications for treatment, and the suitable remedies. We can scarcely venture to speak of the indications as to the causes of the complaint, while our present ignorance of the etiology continues. The antigastric and derivative method, the application of counter-irritants, &c., have maintained an undeserved reputation. Itard, and more particularly Kramer, have advocated the local application of stimulants, in the shape of vapour. The latter author advises the use of acetic ether by means of a special apparatus. The vapours are conducted by means of a tube through the Eustachian tube into the cavity of the tympanum, from whence they pass into the labyrinth to the auditory nerve. In selecting the remedy the character of the anæthesia is to be had regard to, and we are to vary it according as the disease presents an erethic or torpid type. Tinnitus aurium and great susceptibility to loud noises are said to be characteristic of the former, while the absence of tinnitus is said to mark the torpid variety.

CHAPTER XXV.

ANÆSTHESIA OLFACTORIA.

Anosmia.

The loss of smell caused by anæsthesia of the olfactory nerve is but rarely observed; in the few cases that have been published, it evidently depended upon disorganisation and tumours occupying the base of the brain. Thus, Loder [1] met with anosmia as a consequence of scirrhus of the pituitary body, and Oppert[2] found an abscess of the pituitary gland compressing the olfactory nerves in a female suffering from anosmia and facial neuralgia.

The relation existing between the sense of smell and the sensibility of the nasal cavities is a matter of physiological interest. It is well known to what erroneous conclusions Magendie was led, by confounding the sensibility of the lining of the nose with the sense of smell; in spite of the corrections of Bell and others, he still maintains his former view, that the fifth is the nerve of smell, and that the olfactory nerves must be reckoned among those parts of the brain, with the functions of which we are not as yet acquainted.[3] When we institute experiments upon men or animals, we cannot be too careful to distinguish the effects of sensation and smell. In rabbits Valentin found that dead bodies served as a test; a healthy animal with its eyes tied, instantly scents the dead body and snuffles about it; whilst another, whose olfactory nerves had been divided within the cranium, touches it as if it were a piece of wood, and exhibits no symptoms of scent. In morbid conditions we meet with loss of smell without concurrent anæsthesia of the mental cavities. Thus, H. Cloquet speaks of a patient affected with anosmia, whose father had also been subject

[1] Observatio Tumoris Scirrhosi in basi Cranii reperti; Jen. 1790.

[2] Dissertatio inaug. de vitiis Nervorum Organicis; Berol. 1815.

[3] Leçons sur les Fonctions et les Maladies du Système Nerveux, p. 281.

to the same disease, who was able to perceive the difference between coarse and fine snuff, and sneezed when he took a pinch; he was insensible to the fetor of the dissecting room, and equally so to the stench of the privy, although the gases in the latter were pungent enough to irritate the nose. Bichat[1] knew a man, who had lost his smell in consequence of an abuse of mercurials, but whose nasal mucous membrane was very sensitive to tickling. I have seen a person, who, in addition to other symptoms of cerebral disorganisation, had completely lost his sense of smell, so that if the oil of asafœtida was held to his nose it did not affect him; at the same time irritation of the nasal twigs of the fifth pair was followed by the usual reaction. In my clinical reports[2] I have given the case of a female thirty-three years of age, who was affected with well-marked symptoms of lues venerea, with nocturnal exacerbations of pains in the bones, nodes of the frontal, the parietal bone, and the left humerus. At the same time there was complete anosmia, with unimpaired sensibility of the nasal mucous membrane. The mercurial treatment that was adopted caused the tumefactions of the bones and the other symptoms to disappear, and the smell returned in a corresponding ratio. The most decisive case is one described by Pressat and quoted by Longet,[3] in which the olfactory nerve was entirely absent at the base of the brain, and there were no orifices in the ethmoidal plate, with the exception of those destined for the ethmoidal branches of the first branch of the fifth pair. This individual was affected with complete anosuria, though the sense of feeling in the nostrils was intact; he perceived all irritating and pungent substances, sneezed when snuff or pepper was applied; and though he did not smell ether when held to his nose, he was conscious of a pricking sensation, as if salt had been introduced into his nose.

The loss of cutaneous sensation occasionally exerts an influence upon the energy of the nerve of smell. In one case of anæsthesia of the fifth nerve of the left side of the face, which now presents itself to my mind, the sense of smell is less strong in the left than in the right nostril. In other cases of a

[1] Dict. des Sciences Méd., vol. xxxvii, p. 242.

[2] Klinische Ergebnisse, p. 18.

[3] Anatomie et Physiologie du Système Nerveux, vol. ii, p. 39.

similar description this has not been observed; for instance, in one given by Bell, it is expressly stated that, although a quill feather could be introduced three inches up the left nostril, it caused neither sensation nor titillation, and yet smell was unimpaired in both nostrils.

The influence of respiration upon the activity of the olfactory nerves is well known; a reference to this fact explains the weakened sense of smell in facial paralysis, which causes a paralysis of those motor nerves which supply the muscles of the alæ nasi.

Nobody doubts the existence of a connection between smell and taste in health; we do not possess a sufficient number of observations to determine how this relation is affected in anosuria. In Cloquet's case the taste was unimpaired.

CHAPTER XXVI.

ANÆSTHESIA GUSTATORIA.

Ageustia.

What we include under the above term is the loss of taste owing to the conducting power of the nerve of taste having been destroyed: this distinguishes the affection from an impairment of the sense of taste, resulting from conditions which prevent the action of a rapid substance upon the nerves, *e. g.* dryness of the tongue.

We have yet to determine which of the nerves supplying the tongue performs the gustatory functions. All observers coincide in one point, that it is not the hypoglossus; but the contest is still carried on, as to whether this function belongs to the lingual branch of the fifth or the glosso-pharyngeal, and the advocates on either side have anatomical, experimental, and pathological evidence to bring forward in support of their views. The pathological facts more immediately concern us.

The following observations may be adduced in proof of the gustatory powers of the fifth:

1. A case communicated by Sir C. Bell.[1] Anæsthesia of the second and third branch of the fifth pair of the left side, was accompanied by loss of taste and sensation in the corresponding half of the tongue. An encysted tumour was found to have compressed the fifth nerve to such an extent that it appeared flattened and atrophic. The facial and acoustic nerves had also suffered from the pressure.

2. A case described by Bishop.[2] There was anæsthesia of the left half of the face and head—the left bulb was insensible to touch, though the eye-sight was unimpaired. The most powerful irritants, ammonia or tobacco, applied to the left nostril, produced no effect, while the sense of smell continued.

[1] The Nervous System, &c.

[2] Müller's Archiv, 1834, p. 132.

The left half of the tongue was perfectly insensible to sensory or gustatory impressions. There was a scirrhous tumour on the inner surface of the sphenoid bone, extending laterally to the internal auditory foramen, and backwards as far as the pons Varolii, which was superficially ulcerated. The tumour completely blocked up the foramina, by which the three branches of the fifth pass out of the skull.

2. The following case was published by myself in Müller's Archiv, 1838, p. 305:

A widow, aged 42, had, four years previous to the period of observation, received a severe injury by falling down stairs backwards, with a heavy basket, and striking her occiput. A year after the catamenia ceased. Since this period, she was subject to fits of sneezing, which increased in violence and frequency, deprived her of sleep, and were excited by the most trivial cause. Nothing irregular was discovered on examining the nostrils; the injury that had preceded, induced me to suspect some lesion within the cranium, which irritated the nasal twigs of the trigeminus. I tested the sensibility of the parts to which the first and second branches are distributed, but discovered no aberration; but on experimenting upon the third branch, in order to comprise the whole sphere of the fifth pair, I found anæsthesia throughout its course on the left side. I shall condense the results of the experiments which I have repeatedly made before the students attending my lectures, as well as in the presence of Professor Müller, and other medical friends.

The left half of the lower lip, externally and internally, and the left side of the chin, were insensible to pricking with a sharp vaccine needle. The same was the case with the left concha and external meatus, which were entirely insensible, and did not even display any sensation when a lighted taper was introduced. The skin of the left temple, in the vicinity of the hair, was equally insensible. The left half of the tongue also partook of the anæsthesia; pricking caused no pain at the lip, nor at the edges, nor in the middle, nor was there any perception of heat or cold. On the right side, the corresponding parts possessed the normal sensibility; and in the left half of the face, the other nerves of sensation retained their integrity; so that the range of the third branch could be very accurately

defined. When the skin of the temporal region was scratched nearer the forehead, the patient at once drew back, from the tract of the frontal nerve having been invaded. Pricking the horizontal ramus of the lower jaw, caused a vivid sense of pain, as the upper cutaneous branches of the third cervical nerve retained their conducting power. On the other hand, the left half of the tongue was entirely deprived of the power of taste. The patient could not taste the most varied articles of diet on this side, while the sense of taste was normal on the opposite side. Thus he remained quiet, when I strewed a little powdered colocynth upon the affected half of the tongue; but instantly made a grimace, and exclaimed, " how bitter !" when I placed some on the right side of the organ, and attempted to get rid of the unpleasant impression by spitting out the powder. The same occurred when salt or sour substances were applied.

Though a partial disturbance was manifested in regard to sensation, none was perceptible in the motor functions of the left half of the face. Neither in the features, nor in the respiratory or masticatory movements, was any difference between the left and right sides to be discovered; they were performed normally. The same remark applies to the articulatory and masticatory movements of the tongue; nor was the nutrition of the left side at all impaired. Dimensions, temperature, and colour, were identical on both sides. The blood exuded as freely and copiously from the small punctures on the left as on the right side. The tongue was equally moist and furred on both sides. From these symptoms I formed the following diagnosis:

The anæsthesia being confined to the third branch of the portio major of the trigeminus, it was to be assumed that the affection of the branch was isolated; and, moreover, that it was the result of compression, as it was mere anæsthesia unaccompanied by painful sensations in the anæsthetic parts, at least during the time she was under my observation. The compressing medium might be assumed to involve the trunk of the nerve, the complex of the primitive fibres, because the entire distribution, as far as it could be tested, was deprived of sensation. It was evident, from the presence of sensibility in the range of the first and second branches, and from the absence of other characteristic symptoms, that the seat of the compression could not occupy the Casserian ganglion, where the third branch

comes into close relation with the first and second. I was as little justified in assuming the compression to be exerted upon the nerve after its issue from the foramen ovale, because at this portion, the fibres of the portio minor are so closely united to the sensory filaments, that pressure must necessarily have paralysed both at once, and this was proved not to be the case, by the normal state of the movements of mastications on the left side of the face. I therefore felt satisfied, that the third branch of the fifth pair was compressed in its course through the cranium, anterior to the foramen ovale; and that there was a tumefaction of the dura mater, or the bone, of limited extent, as the adjoining portio minor was not involved in the paralysis.

The patient died on the 19th of March, 1838, of dropsy; and the corpse was brought to the dissecting room, where, in the presence of Professors Müller, Henle, and Schwann, and Dr. Philipp, before the body was opened, I again explained my diagnosis, and the grounds upon which it had been formed. Professor Henle, with his accustomed care, examined the contents of the cranial cavity, and obtained the following results:

The surface of the cerebrum was covered with gelatinous exudation, which here and there was white and opaque. At the interior surface of the posterior lobe of the left hemisphere, an almost circular spot, of about one inch in diameter, corresponding to the posterior horn of the lateral ventricle, was softened, but without presenting any vascular congestion in the vicinity. The brain and medulla oblongata were otherwise healthy. The third branch of the fifth nerve of the left side, at the point where it passes into the foramen ovale, was surrounded at its external surface, with a reddish vascular membrane, consisting partly of fibres, and partly of very small watery vesicles. On more minute examination, it proved to be an exudation of the neurilemma; towards the cranial cavity, it gradually passed into the tissue of the dura mater; on the other side it passed into the normal neurilemma. The neurilemma was thickened and reddened in the entire passage of the nerve through the sphenoid bone; and also a little beyond it to the point at which the otic ganglion lies. The nerve appeared tumid, so far as the neurilemma was altered; it was yellowish, and perhaps somewhat harder than in the rest of its course. The portion of the third branch derived from the ganglion Casseri, alone participated in this alteration;

the motor root passed uninjured along the inner side, and only joined with the larger portion below the diseased portion. All the nerves supplying the pterygoid and buccinator muscles, the temples, the tongue, and the lower jaw, were perfectly healthy, as also the third branch of the fifth on the right, and the glosso-pharyngeus on either side.

4. A remarkable case, which occurred in the Clinical wards of Professor Blasius, of Halle, and has been described in the dissertation of Dr. Franz von Meyer, in his 'Dissertatio inauguralis sistens paralyseos nervi trigemini casum.' (Jena, 1847.) It is as follows:

A female, who was in the seventh month of pregnancy, was wounded by a pistol shot on the right side of the neck. A few days after, anæsthesia of the right half of the face ensued; there was paralysis of the muscles of mastication, and inflammation of the eye, which left a large cicatrix in the cornea. The wound of the neck healed, and the patient was enabled to resume her domestic occupation. Four weeks later, she was attacked with paraplegia. Parturition ensued, and presented no difficulty. On her admission into the hospital, she presented the following symptoms: there was disease of the cervical vertebræ, the neck was immovable, the head could only be moved very slightly and with great pain; the head was inclined to the left side, so that the chin rested upon the left clavicle. The left arm and leg were paralysed, and there was anæsthesia of the right half of the face and their cavities. The front of the right half of the tongue was insensible, whilst the root of the tongue retained its sensibility, and vomiting ensued if it was touched. There was entire loss of taste at the tip and middle of the right half of the tongue; the patient could taste sugar, acetic acid, ink, or rhubarb, placed on the front of the left half of the tongue, but the right side was entirely unable to receive sapid impressions. As the mouth could not be properly opened, the experiments could not be instituted, upon the right side of the back of the tongue, with sufficient accuracy; rhubarb was the only thing distinctly tasted.

The muscles of mastication on the left side of the face were paralysed; the movements of expression continued uninterrupted. On the right eye there was a large cicatrix on the cornea; the iris was unaltered, the pupil contracted but moveable. The

gums of the right side were in a condition of scorbutic softening, blood was frequently discharged from the right nostril, and the mucous membrane was excoriated. The capillary vessels of the right cheek continued congested up to the period of death. The temperature of the right cheek and infraorbital region remained to the last 1—1½° R. (2¼°—3° F.) warmer than the left side. The secretions of the eye, nose, and oral cavity remained unimpaired; equally so the nerves of the special senses. The patient was unable to turn the eye outwards. Deglutition was painful and laborious; opening the mouth and putting out the tongue was troublesome; the sound of the voice weak. Subsequently alvine incontinence alternated with retention of urine. Gangrenous decubitus ensued with a sensation of cords round the epigastrium. Formication and pain in the right infraorbital region. Towards the end of the fourth month after the injury, some alterations occurred in the nervous symptoms; a slight contractility returned in the muscles of mastication, with trifling sensibility in the right half of the face. The sphincters commenced to resume their office; the paresis of the upper extremities diminished, but rapid suppuration occurred in the right lung, with colliquative diarrhœa, which caused death in the seventh month after the wound had been inflicted.

In the post-mortem examination the track of the ball, which was indicated by black pigment, was the first object of attention. It lay on the right side between the muscles of the neck under the large horn of the os hyoides, in the direction of the glottis; a portion of the edge of the latter was torn off, and cicatricial bands, the remains of the closed wound, were found at the base of the rima glottidis. The posterior wall of the pharynx was perforated at the point at which it is attached to the second cervical vertebra. The hole, of the size of a pistol bullet, was seated an inch and a half under the Eustachian tube, and led into a carious excavation of the body of the vertebra, posteriorly bounded by the dura mater of the spinal cord. No further trace of the wound was to be discovered from this point. The lower six cervical vertebræ, and the two upper thoracic vertebræ, were carious. In the middle of the bodies of the vertebræ the caries extended to the fifth cervical vertebra, and then divided into a right and left furrow, between which the bone was healthy. By pursuing the course of these sinuses, a vomica in

the right lung, of the size of a man's fist, was reached, occupying the entire upper lobe. An abscess of the size of a walnut was found in the left lung; there was no trace of tubercle anywhere. The dura mater of the spinal canal at the atlas was intimately adherent to the arachnoid, and also from the second cervical to the first dorsal vertebræ. At the anterior portion of the right os petrosum, the bullet was found lying close to the ganglion petrosum enclosed in a cyst, and adhering to the petrous bone by a piece of grey fibrous tissue. The two divisions of the right trigeminus, as well as the ganglion Casseri, were reduced in size; the three branches and the abducens were softened, and of a yellow tinge; the same was the case with the middle lobe of the cerebrum. The remaining cerebral nerves, especially the oculomotor, the facial, and glosso-pharyngeal, were normal. The summit of the pyramid of the petrous bone was carious in the vicinity of the carotic canal. The foramen lacerum anterius was surrounded by caries, and there were also erosions and irregularities in the sella turcica.

On the other hand we are not without observations which testify against the assumption that the lingual branch of the trigeminus is the nerve of the sense of taste. Dr. Stamm reports one of this kind, with the post-mortem account, in the 'Heidelberg Medicinische Annalen.'[1] A man, aged 50, complained in October, 1837, of a trifling pain at the upper part of the neck at the right side of the fauces, which was chiefly perceptible when he swallowed his saliva. The right nostril gradually became impervious to air; intermittent pains in the right temple and cheek supervened, which yielded to the exhibition of quinine whenever they presented a regular tertian type. The pains disappeared in the temporal region, but extended in the right cheek, from the lower eyelid inclusive to the right half of the upper lip and nose; the paroxysms frequently presenting a tertian type. The levator palpebræ superioris and the external rectus of the right side became paralysed. The pains ceased and yielded to anæsthesia. The superficial integuments, the conjunctiva of the right lower eyelid, the right half of the nose and upper lip, externally and internally, the portion of the right cheek enclosed by the nose, and a line drawn from the right angle of the mouth to the

[1] Vol. i, p. 70.

outer angle of the eye, could be punctured deeply, so as to draw blood, without being felt by the patient. The passage of air through the left nostril now became interrupted. Ocular inspection showed above and behind the soft palate, which was somewhat depressed, a hard nodulated tumour, which rapidly increased in size, and rendered deglutition so difficult, that the patient was able to swallow nothing but liquids, and these only with danger of suffocation. The hard palate sunk deep down into the cavity of the mouth. About this time new pains occurred in the right half of the mouth, in the right half of the lower jaw, and the teeth, and especially in the right half of the tongue. These occasionally presented a tertian type, and yielded to quinine; a few days after the inner surface of the right cheek, the gums of the upper and lower jaw, the corresponding half of the hard and soft palates, the nether lip, and the tongue, also proved to be completely insensible to pricks with a needle. At the same time the faculty of taste continued; when the tongue was stretched out and a strong bitter applied to the edge, the patient tasted it; this experiment was repeated several times. The sense of taste was more vivid on the left side of the tongue. The mucous membrane of the right side of the mouth was shining and dry from the commencement of the anæsthesia, while the left side was moist. There was no paralysis of the muscles of mastication or expression. From time to time dark, and occasionally fetid, blood was discharged from the mouth and nose. The patient now remained free from pain, but fell into a state of sopor, which ceased after the hard palate gave way, and allowed the discharge of a sanious ichor. The movements of the levator palpebræ superioris had been restored previously. The patient was able to respire better by the nose, and to swallow liquids. A week after he died.—*Sectio cadaveris:* The base of the cranium immediately behind the sella turcica was perforated to the extent of a four-penny piece, the body of the sphenoid bone had almost entirely disappeared, the anterior lip of the petrous portion of the right temporal bone was also destroyed, and the osseous tissue immediately surrounding the orifice, was of an ashy-grey colour, very porous and friable. On the right wing of the sphenoid bone, immediately over the foramen rotundum, extending outwards three quarters of an inch in length, there was a pale, red, firm,

tuberous mass, from $1\frac{1}{2}$ to $2\frac{1}{2}$ lines thick; with this tumour the fifth nerve, at the point where its ganglion divides into three branches, was so intimately adherent, that it was impossible to detach the nerve from the surrounding mass by dissection. It was only near where the ophthalmic branch is given off, and near the origin of the third division, that nerve tissue could be traced. The oculomotor and abducens nerves showed their normal structure shortly before entering the upper fissure of the orbit. Mere traces of the right pterygoid process and the right hard palate remained. The hard palate presented a central perforation. The same diseased mass which exhibited all the characters of scirrhus, was attached to the posterior surface of the fauces; forming separate tubers with an ash-grey and ulcerated surface. The right tonsil was converted into a yellow brawny mass.

Dr. Bérard has published a case of no less importance in the 'Gazette Médicale de Paris.'[1] A man, aged 64, attempted suicide by firing a pistol into his right ear; and as this did not destroy his consciousness, he fired a second shot at his forehead, but the bullet only injured the soft parts, and came out at some distance from the point at which it entered. On examination the petrous bone proved to be fractured, blood was discharged from the ear mingled with small debris of cerebral matter. The patient remained conscious, complained of excessive pains in the head, coldness, nausea, and vomiting. The cutaneous surface was pale and cold; the pulse small and retarded; and his features distorted by a complete paralysis of the right half of the face. The external muscle of the eye of this side was paralysed, for which reason, whenever the left eye moved towards the nose, there were strabismus and double vision. The entire right side of the face and its cavities, and of the head to the vertex, were deprived of sensation. The patient himself had an impression of the skin being swollen; and when he drank he approached the glass close to the right half of the lips with his hand, as he believed that the impediment was produced by their tumefaction. Vision and smell were normal. The movements of the tongue had not suffered in the least, though its right half as well as the inner surface of the cheek, the hard and soft palate, and the tonsil of the right

[1] No. 30, August, 1840, p. 490.

side, were deprived of sensation. The sense of taste was unaffected; when sugared water, vinegar, and other liquids were dropped upon the right half of the tongue near its margin, the patient invariably stated correctly what the substance was. After the eighth day his condition became more alarming; restlessness, delirium, paralysis of the left arm and leg, supervened, and on the tenth day death ensued.

On dissection the pars petrosa of the right temporal bone was found broken up into splinters. The fifth nerve of this side was congested, and so much softened, that it was easily torn at the upper surface of the petrous bone. The serous fluid which ordinarily surrounds it at this spot was absent. The ganglion Casseri participated in the congestion and softening. The branches of the fifth were normal, the second only was somewhat congested. The abducens was somewhat reddened, and softer than the same nerve of the opposite side, in the neighbourhood of the posterior clinoid process. The facial nerve was entirely destroyed where it passes through the aqueduct of Fallopius. In the lower portion of the middle lobe of the right hemisphere, where it lies upon the petrous bone, a loss of substance was perceptible, leading to a cavity of the size of a small egg, containing pus, softened portions of cerebral tissue, and the bullet. The cerebral tissue in the vicinity was red, congested, softened, and infiltrated with pus.

Burrows, Noble,[1] Vogt,[2] also gave instances, though unaccompanied by post-mortem verification, of anæsthesia of one trigeminus, accompanied by an entire loss of sensation in the corresponding half of the tongue, without the taste being involved. I have lately met with a similar case myself. The patient, a woman aged 57, labours under an attack of anæsthesia of the fifth nerve of the left side. The surface of the face and its cavities are insensible to external injury and to every change of temperature. The left bulb, the pupil of which presents the same diameter as that of the right, suffers the pricking of a pin; the vessels of the conjunctiva certainly at once become congested, but neither blinking nor tears ensue. When a piece of ice is placed upon the eye the patient is ignorant of the temperature. If ammonia is applied to the

[1] Valentin, loc. cit., p. 44.

[2] Müller's Archiv, 1840, p. 72.

left nostril, or if it be tickled and irritated with a notched quill feather, or pungent snuff introduced, neither sensation nor reflex action—in the shape of sneezing—occurs. The left half of the tongue, as well as the mucous membrane of the left side of the oral cavity, have lost their sensibility. Powdered colocynth or sulphate of quinine applied to the front and middle part of the tongue, are not tasted so long as the member is protruded from the mouth; but the taste becomes perceptible as soon as it is drawn into the mouth. I repeated this experiment on the following day, by ordering the patient to put out her tongue, and touching the root with the bitter substances. Taste manifested itself as vividly on the left as on the right side.

I did not make the experiment in the previous case in this manner, but was satisfied to find taste deficient in the anterior and middle portion of the affected half of the tongue, and must therefore admit that its conclusions, with regard to ageustia, are incomplete. The statements of other authors must be estimated in the same way, as their experiments were not carried out with a due regard to all sources of fallacy. We must except the case related by Dr. Rigler (p. 218), who states expressly that the sense of taste was lost to the anterior and middle portion of the left half of the tongue, but that the whole root of the organ continued in the entire possession of its faculty of taste.

There is another circumstance which also appears to me to subvert the opinion that the lingual branch of the fifth pair is the medium of sensation and taste, viz. the absence of imaginary taste in hyperæsthesia of the lingual nerve. The patient spoken of at page 37, affected with tic douloureux, never lost his sense of taste, however frequently the torturing pains occurred.

If we compare these negative arguments with those of a positive character, deduced by Valentin, with extreme accuracy, from anatomical and physiological data, the assumption that the glosso-pharyngeus is the nerve of taste appears the most probable, although we are not as yet provided with pathological proofs. Among the facts quoted, those of Horn and Picht are particularly important; they are to the effect that the application of acids to the papillæ vallatæ does not excite a sour but a bitter taste.[1]

[1] Loc. cit., pp. 41, 45, 117.

The influence of sensation upon the special sense, which was so palpably manifested in the case of the patient affected with anæsthesia of the inferior maxillary branch of the trigeminus, is not opposed to this, for the sense of taste is the one in which the sympathetic action of sensitive and sensual nerves is most vivid, so that it is often a matter of difficulty to analyse the impression into its constituents of sensation and taste.

We must here allude to a peculiar modification of taste, nausea. This sensation differs from other gustatory impressions in this, that it may be excited by the mere mechanical irritation of those parts to which fibres of the glosso-pharyngeus are distributed. If the finger is carried along the tip, the edge, or middle of the tongue, it merely induces the ordinary sensation; but the instant the root of the tongue, the papillæ vallatæ, or the velum palati are approached, the sensation of nausea is induced, followed by the reflex action of retching. This action renders the glosso-pharyngeus the guardian and protector of the digestive apparatus; in the same way as the laryngeus superior watches over the entrance to the respiratory organs. The hyperæsthetic state of nausea is not unfrequently associated with other morbid conditions, as hysteria or hypochondriasis, and occasionally also with organic affections of the brain; whilst anæsthesia is marked by the absence of nausea under circumstances likely to give rise to it.

CHAPTER XXVII.

ANÆSTHESIA OF THE SYMPATHETIC GANGLIA AND THEIR NERVES.

We must at once confess to an utter ignorance of these conditions; they have not even been mentioned until now, and their investigation is connected with great difficulties. We have already pointed out, that impressions made upon the sympathetic system are not generally conveyed to the brain; it is only when the irritation is powerful, and in hyperæsthesia, that the individual becomes conscious of them; the loss of the conducting power can therefore only be inferred from the cessation of pain or other sensations, while the cause continues to operate, as in gangrene of the intestine; but even this would be unsatisfactory. On the other hand, the conducting power of the sympathetic is chiefly of a reflex character, inducing movements, whose cessation would be an immediate consequence of anæsthesia occurring in this system. An instance of this is afforded in loss of motion of the intestine or the secretory ducts, and even of muscles that are under the influence of the cerebro-spinal system; forming a contrast to the extravagant reflex action which accompanies hyperæsthesia of the sympathetic. This subject will be treated of in detail in the chapter on Reflex Paralysis, in the concluding portion of the work, to which we refer the reader.

CHAPTER XXVIII.

ANÆSTHESIA OF THE SPINAL CORD.

The phenomena vary according to whether the spinal cord is affected as the conductor of the brain, the medium of conscious sensations, or as the centre of reflex action.

The posterior strands of the cord serve for conduction, as proved by experiments made on living animals; those of Longet[1] deserve to be particularly mentioned, on account of the great accuracy with which he performed them. After dividing the spinal cord, the portion of the posterior tracts, which lies below the incision, is insensible to all mechanical, chemical or electric irritation, whilst the part above the incision shows that it has not lost its susceptibility to these influences by the violent pains they induce. The anæsthetic influence of æther and chloroform has afforded these experiments still greater probative weight, inasmuch as the posterior portions of the cord may be irritated throughout their entire extent in etherised animals, without producing the slightest effect.

Surgical injuries, which in man display the disturbances of functions within more narrow and accurately defined boundaries than is generally the case in disease, are rarely accompanied by exclusive anæsthesia of the spinal cord. But few observations of this kind are on record, and they are not confirmed by post-mortem examinations. Thus Boyer relates the history of a soldier, who was wounded at the upper and back part of the right side of the neck by a sword thrown at him, and was attacked with paralysis of the right arm and weakness of the right leg, the sensibility continuing unimpaired. The affection of the leg disappeared after a few days, that of the arm continued. The extremities of the left side retained their motility, but had lost their cutaneous sensibility. The left side of the thorax, the abdomen, the penis, and the scrotum, were insen-

[1] Recherches Expérimentales et Pathologiques sur les propriétés et les Fonctions des Faisceaux de la Moëlle Epinière et des racines des Nerfs Rachidiens; Paris, 1841.

sible. The sensibility was normal above the fourth rib.[1] A few similar instances are recorded in Ollivier's work.[2]

Disease may be limited to the posterior strands of the cord, though it is more frequent to find coexistent disease of the anterior portions of the cord and paralysis. Montault has published a case of compression of the posterior surface of the spinal cord, by an hydatid tumour, which at first impaired the sensibility of the left, and afterwards of the right side.[3] Cruveilhier[4] has described several cases of degeneration of the posterior portions of the cord, which were characterised by anæsthesia. The subject has been recently enriched by valuable observations and investigations into the nature of the Norwegian leprosy.[5] Of the two forms in which the disease occurs, the tubercular and the anæsthetic, the latter alone presents any neuro-pathological interest; the chief features may be comprised in the following brief sketch; for the details, we refer to the work quoted.

Frequently, an eruption of bullæ, resembling pemphigus, precedes for a succession of years; the bullæ burst and ulcerate superficially, leaving white shining cicatrices. White spots, the morphea alba of old writers, are occasionally forerunners. An exalted sensibility of the skin follows, which is confined to small spots, or affects a larger extent of surface, the extremities, or a portion of the face; it increases to such a pitch, that every movement induces violent pain, and the slightest touch causes the patient to start, as if he had received an electric shock. This state of hyperæsthesia may endure for years; it then ceases and passes into anæsthesia, which gradually extends over the entire body. The patient does not feel that his feet touch the ground; his gait is tottering. The face assumes a deadly hue, the skin generally becomes pallid, dry, and in parts as hard as parchment; it loses its elasticity, and when pinched up into a fold does not soon return to its natural position. There are deep, shooting pains in the head, which settle above the root of the

[1] Traité des Maladies Chirurgicales, vol. vii, p. 9.

[2] Traité des Maladies de la Moëlle Epinière, 3d ed., vol. i, pp. 360 and 509.

[3] Ollivier, loc. cit., p. 468.

[4] Anatomie Pathologique, livr. xxxii.

[5] Traité de la Spédalskhed, ou Elephantiasis des Grecs, par Danielsen et Boeck. Traduit du Norwégien, &c.; Paris, 1848, pp. 264—296.

nose, and there is an intolerable dryness in the eye. The conjunctiva seems injected, the cornea becomes opaque, covered with thick greenish-yellow scabs, which fall off to make room for fresh ones. Perforating ulcers rarely form, and iritis only occurs in exceptional cases. The caruncula lacrymalis becomes atrophied, and disappears with the punctum lacrymale, the cilia fall off, and the tarsus becomes so thin, as almost to disappear. The nose continues dry, and the septum is perforated by ulcers. The gums become pale and atrophic. The sense of taste is rendered obtuse, though hearing continues unimpaired. The lower eyelid is lax and pendulous at its outer angle, the mouth is distorted, the lower lip drops, and the patient can neither close his mouth nor distinctly articulate the labials. The anæsthesia attains the highest degree; not only is the surface of the eye insensible, but deep incisions can be made without causing the least pain, and the patient may be burnt so as to char the parts, and limbs may be amputated without causing the slightest manifestation of pain. Daniellsen saw individuals cut off their necrosed fingers, and then to arrest the hæmorrhage, dip them into boiling pitch; and all this without the least pain. In all the anæsthetic cases, nutrition was much impaired; and as the former frequently commences in the hands, they become emaciated from the commencement. The patients generally are chilly; the temperature of the hands is rarely above 26° R. (90° F.), often only 16° R. (68° F.); in the axillary and inguinal regions it is never under 29° R. (97° F.) The sexual appetite is in abeyance, and the genitals are also affected with anæsthesia. As the disease advances motility becomes impaired; the fingers curve in, ulcers form on the sole of the foot, extending wide and deep, painless, and atonic. Finally, necrosis supervenes, commencing at the toes and fingers, gradually advancing, and causing the phalanges and entire limbs to fall off.

The characteristic nervous symptoms of this form of leprosy meet with a satisfactory elucidation in the post-mortem appearances. The arachnoid and the pia mater at the posterior surface of the spinal cord are firmly bound together by an albuminous exudation occupying the cervical, dorsal, or lumbar regions, and generally spreading partially to posterior roots of the spinal nerves. This exudation is very rarely found at the

anterior surface of the spinal cord, and never without at the same time investing the posterior. At these points, the membranes are so intimately adherent, as to be easily detached together from the spinal cord, which here presents greater firmness. The grey substance is paler and more firm than in the normal state. At the climax of the disease and the anæsthesia, a considerable amount of albuminous serum is found between the dura mater and arachnoid. The exudation just spoken of is from two to three lines thick, presents a yellowish white tint, and envelops the entire spinal cord, but is thicker at its posterior surface, and of a darker colour. The membranes from being thus fused together, resemble the dura mater. The tissue of the spinal cord presents cartilaginous consistency and toughness; grates under the knife; and when compressed becomes flat, without losing its cohesion. The spinal cord generally is found thinned and atrophic; in several instances, the axillary and sciatic plexus were remarkably atrophied. The grey substance is entirely altered, presenting a dirty yellow colour. In the cervical and lumbar portions the sclerosis, atrophy, and exudation have attained their highest degree, whilst the dorsal portion presents fewer alterations. In only one case, a small spot of softening was discovered in the spinal cord.

In the cranial cavity, more or less, a sero-albuminous exudation occurs between the arachnoid and pia mater; at times, it is found in so large a quantity, as to fill all the interstices between the convolutions. The two membranes adhere intimately to one another, and may easily be detached from the cervical substance of the brain. The exudation is also met with at the base of the brain, especially in the locality of the fifth, sixth, seventh, and eighth pairs; in all cases in which there was anæsthesia of the face, the ganglia Casseri presented morbid changes. The exudation is not only deposited on the surface, but the fibres within the ganglion are also agglutinated to one another. The branches of the fifth again, present no abnormity. The tissue of the cerebrum appears harder, and in part more tenacious than ordinary. The peripheral nerves of those patients in whom gangrene and necrosis have committed extensive ravages, are much tumefied, and their sheaths filled with a firm albuminous deposit.

Lead poisoning, which is generally so valuable a mine for affections of the nervous system, also exerts an arresting influence upon the conduction of sensation by the spinal cord. The anæsthesia may exist for itself, or in rare cases it is accompanied by paralysis, but without occupying the same parts. Colica saturnina occasionally precedes. Saturnine anæsthesia is rarely very extensive, but confines itself to small regions of the trunk and extremities of one or both sides. Beau has observed that it is generally incomplete; the perception of pain from external irritation (analgesia) ceases, although the sense of touch continues undisturbed in the cutaneous nerves. The patient states that he feels the touch of the needle when he is pricked, but no pain. The phenomenon occurs most distinctly in the skin of the upper and forearm, and, according to Beau's statement, is never absent in lead poisoning. Complete anæsthesia occurs more rarely, and is a proof of a higher degree of poisoning.[1] Its sudden appearance and rapid increase, its variable seat and extent, and its short duration, of a few weeks only, are characteristic symptoms. When accompanied by paralysis it disappears before the latter. It only affects such workmen that have long been under the influence of saturnine effluvia, and also present the other evidences of poisoning, viz., a yellow tinge of the conjunctiva and of the urine, emaciation, a brown hue of the teeth, and an ashy colour of the gums. In two post-mortem examinations made by Tanquerel, no visible alterations were perceived in the spinal cord. If the patient relinquishes his occupation a cure may ensue spontaneously, and it is promoted by the use of sulphur baths, blisters, moxæ, electricity, strychnine, and drastics.[2]

Ergot of rye is another poisonous agent which produce anæsthetic effects. Ergotism commences with formication and cutaneous anæsthesia, in the tips of the fingers, subsequently affecting the anus and legs, and occasionally also the face and tongue. In the advanced degrees of the malady the anæsthesia attains such a degree, that the patients will put their hands into the flame of a candle, or hold burning coals, without exhibiting a trace of sensation.

When the spinal cord has lost its power of conducting sensa-

[1] Archives Générales de Médecine, 1848, pp. 1—24.

[2] See Tanquerel des Planches, Traité des Maladies du Plomb, vol. ii, pp. 200—247.

tion, the limit of the injury and the disease is at the same time the limit of the anæsthesia; those fibres alone lose their sensitive functions, which leave the cord at or below the affected part. Surgical experience affords the most palpable illustration of this, and its results are allied to those afforded by experiments made upon living animals. Bell quotes a few instances in which the patients remarked upon the difference in the sensibility of the external and internal parts of their body. The cutaneous coverings of the abdomen were insensible, whilst compression of the stomach was painful, because the vagus lay above the fracture of the vertebræ, and was uninjured.

The law of isolated conduction applies as much in reference to spinal anæsthesia as it does to anæsthesia of the peripheral nerves. Anæsthesia saturnina affords a proof of this; and after injuries of the spinal column, the insensibility is either confined to certain tracts of nerves, or if more extensive, and a favorable issue takes place, continues for a length of time in individual nerves. It is not long since a case of this kind was presented to my notice: a robust man, aged 25, had fallen from a considerable elevation upon his sacrum, in consequence of which he was attacked with paraplegia, paralysis of the sphincters, and anæsthesia. Eight months after the accident I saw him for the first time; the paralysis had almost disappeared, the incontinence of urine had ceased, though the discharge of urine was not affected with proper vigour, and when he coughed or sneezed it was voided; there was anæsthesia confined to certain nerves, and symmetrical on the two sides of the bodies. It affected the cutaneous distribution of the glutæi, the dorsal nerve of the penis, the inferior pudendal that supplies the scrotum, the middle posterior and inferior cutaneous branches of the sciatic, and the internal peroneal nerve. The obturator, crural, and plantar nerves, retained their conducting power unimpaired.

The law of eccentricity also holds good here. Formication, painful sensations, a sense of heat or cold, very often occur in the superficial and deep-seated parts, deprived of sensation by spinal anæsthesia.

In the same way as an increase in the centripetal excitement of the spinal cord is exhibited, either as pain, or as sensation and reflex action, or as reflex action only, the diminution or arrest of excitement is also manifested; this is most distinctly

the case when we find reflex sensibility continuing when the sensibility, dependent upon the spinal cord as a cerebral conductor, is interrupted. In his memoirs on the nervous system,[1] Marshall Hall communicates the case of a young man of 19, who had been rendered paraplegic owing to a fall from a tree. The lower half of the trunk, and the legs were deprived of their sensibility and power of voluntary movement. Nevertheless, when the skin was pinched and the sole of the foot tickled, the limbs were drawn up with violence. The same took place when cold water was sprinkled on the surface, although the cold was not felt. One leg was constantly bent, and immediately reverted to this position after being stretched. On the introduction of the catheter, erection of the penis ensued, at the same time the legs were drawn up, and it was observed that their muscles quivered. The sectio cadaveris showed that the continuity of the spinal cord had been almost entirely interrupted. Grainger[2] relates the case of a girl, æt. 15, whose lower extremities, in consequence of angular curvature, had lost all sensation and motion, but when the sole of the foot was tickled, instantly retracted, although the patient was not conscious of the titillation. Valentin[3] speaks of a woman who was affected with such complete anæsthesia of the lower extremities, that she scalded her feet in a hot bath without perceiving it, and yet tickling the sole caused reflex movements of the entire foot, and tickling of the dorsum of the foot only induced movements in the large toe. Similar phenomena have come under my notice in a more marked degree, in a patient affected with paraplegia. Rubbing a small spot in the vicinity of the left trochanter, which conveyed to the patient merely the impression of friction, instantly caused powerful extension of the left leg and foot. Pouring cold water over the back, excited the most violent contractions of the trunk and lower extremities.

The longer the interruption to the conduction of sensation at any part of the spinal cord has endured, the less will the parts below the lesion be able to respond by reflex action to centripetal conduction.

[1] Page 63; London, 1837.

[2] Observations on the Structure and Functions of the Spinal Cord; London, 1837, p. 94.

[3] De functionibus Nervorum Cerebralium, p. 100, § 33.

CHAPTER XXIX.

ANÆSTHESIA OF THE BRAIN.

Anæsthesia occurs in the brain either as a conductor of sensibility, or as the organ of perception.

The first variety is less frequent than in the spinal cord, and generally affects the nerves of the senses and of cutaneous sensation, accompanied by motor paralysis of the side opposite to that occupied by the disease. Hæmorrhage into the brain is especially liable to be preceded or accompanied by anæsthesia. In softening, we occasionally meet with pain in the insensible parts, according to the law of eccentricity. In those cases which terminate favorably, sensation is restored earlier than the power of motion.

We more commonly find that cerebral anæsthesia is caused by arrest or loss of perception, while the conducting power remains. It is the common accompaniment of insensibility. It is most marked and complete in epileptic seizures, of which it may be said to be pathognomonic. Ecstatic and somnolent states, and narcotisation, are generally accompanied by this affection; it is a uniform feature of cerebral agony. Overpowering emotions may also induce it; several instances of this have been recorded by my late friend Dr. Heim.[1] Lastly, we must allude to the incomplete anæsthesia occurring in the deaf and dumb, and in idiots, who often bear the most cruel self-mutilations without evincing a sign of pain.

There is also a psychical anæsthesia occurring in a perfectly healthy brain, and dependent upon a withdrawal of the attention; it may well be looked upon as the converse of psychical hyperæsthesia, which presents itself to us in the shape of hypochondriasis. The most common instances are afforded in certain impressions of taste and nausea, which may be early removed by ethnical or other circumstances. Not unfrequently defective intellectual culture is at fault. The senses require

[1] Vermischte Medicinische Schriften, p. 99.

cultivation more particularly, and when this is neglected, perceptions cannot become accurate and defined, and obtuseness in various degrees, presents itself to us. This leads us, at the close of this section, once more to dwell upon the importance of the part borne by the intellect in sensation. Upon this depend those perverted perceptions which some authors have treated as qualitative changes, and have therefore placed in a distinct section of the neuroses of sensibility. We postpone the consideration of these affections until we investigate the logoneuroses, under which head they will be more appropriately introduced.

DISEASES OF THE NERVOUS SYSTEM.

CLASS II.

THE DOCTRINE OF THE NEUROSES OF MOTILITY.

CHAPTER I.

NEUROSES OF MOTILITY.

A neurosis of motility is that vital process in which the activity of the centrifugal nerve, owing to a change in its excitability, deviates from the normal condition.

The activity of the centrifugal (motor) nerve is manifested by the contraction of the muscular fibres supplied by it, and this manifestation, when abnormal, may be exalted or depressed and extinguished; in the former case we have to do with *hypercinesis*,[1] in the latter with *acinesis*.

Consequently there are two organic elements, the motor nerve and the contractile fibre, whose mutual action is necessary, and to both of which we must pay especial attention. The integrity of the muscular fibre is an essential condition of contraction; the nerve loses all power as soon as the muscular tissue has undergone alterations, though only of a microscopic character;[2] the contractile tissue and the inner coat of the

[1] [Hypercinesis and acinesis, etym., κίνησις, movement, with the prefixes ὑπέρ and α.—Ed.]

[2] Valentin; de functionibus Nervorum Cerebralium et Nervi Sympathici, p. 126.

vessels, though dependent upon nervous stimulation, play a subordinate part in the theory of these neuroses.

The inherent force of the muscular fibre, contractility, is excited by the nervous stimulus, and the stimulus of the arterial blood. The nervous stimulus is the more powerful of the two, and manifests itself even after the sanguineous stimulus has ceased. Frogs move, hop, and jump about for half an hour, and move after the heart has been removed; human beings who are labouring under cholera asphyxia, even execute movements. I have seen patients come to my hospital on foot, stand, walk about, rise up in bed, and move their arms, when the pulse had entirely ceased, so that when an artery of a limb was opened during life, instead of a wave of blood issuing, a mere thin fibrinous concretion appeared. But this capability of motion only endures a short time, and is extinguished with as much certainty as if the conducting power of the motor nerve had been interrupted; we see this occurring in arteritis, unless the arterial blood be supplied by the collateral circulation.

The physiological laws regulating the nerves which excite the contractility, must serve the doctrine of the neuroses of mobility as a basis. We call to mind that, from whatever source the stimulus may come, it can only reach the muscle by the course of the motor nerve. The sensory nervous fibre does not directly excite contractility, whether mechanical, chemical, or electric irritation be applied, and in whatever degree—the only condition is the isolation of the nerve; the fact is sufficiently proved by experiments made upon the infraorbital and lingual nerves. Again, the law of isolated and centrifugal conduction, which applies to the peripheral distribution of motor nerves, is of extreme importance. In obedience to the first of these laws, the motor energy is exalted or extinguished in that nerve-fibre only which is affected by the irritating or obstructing influences, without implication of adjoining fibres, however closely approximated; in accordance with the second, owing to the centrifugal tendency of the motor agent, the effect is not propagated upwards to the nerve-fibres passing off above the affected part. On the other hand, the central organs possess the power of communication, the motor irradiation, as their attribute, impulses being communicated both from sensory

to motor fibres (reflex movements), and from motor to motor fibres (sympathetic movements).

The distinction between peripheral and central action applies to the motor as well as to the sensory nerve.[1] The central organs are the fountain of excitability for the peripheral tracts; a nerve deprived of its connection with them loses its irritability, and also becomes changed in texture.[2] The communication of the excitability by a peculiar essence,—the motor power,—whether effected by means of an undulatory or oscillatory movement, or by whatever other means we may imagine, excludes the existence of rest in the motor nerve. In health it is in a state of permanent activity, like the nerve of sensation (see p. 178); it is not originated, but merely increased and modified, by the stimulus. By this means the muscles are constantly maintained, both in the sleeping and waking states, in an intermediate condition of contraction or tension, called tonicity, which ceases when the central organs decay, and are destroyed; for this reason relaxation of the sphincters, and the dropping of the extremities when raised, like those of a dead subject, are symptoms of serious import. The most powerful stimuli for the excitement of motor nerves, proceed from the central organs. The intellect, the will, impressions, emotions, form one class; the unconscious excitement of motor activity by centripetal irritation, which, in modern times, has been termed reflex action, the other.

The mutual relations of these various actions form a subject of considerable importance, the investigation of which may be prepared by experiments upon animals, but can only be really advanced by observation in man. The following delineations will demonstrate how the cessation of the balance of these actions in the healthy animal economy gives rise to morbid conditions.

Lastly, the form of the excitement of the motor nerves is predetermined by a peculiar disposition in the central organs, with which, as yet, we are, for the most part, unacquainted.

[1] See the Introduction to the Neuroses of Sensibility, p. 1.

[2] Stannius; Untersuchungen über Muskelreizbarkeit,—in Müller's Archiv, 1847, p. 451.

The antagonism, the balance, and the co-ordination of movements depend upon this. The unsymmetrical but harmonious movements of seeing eyes afford a proof that, notwithstanding the existence of symmetrical nerves and muscles, the movements are guided by an equilibrium dependent upon sensual impressions.

CHAPTER II.

HYPERCINESES.

SPASMS.

The character common to this class of affections is, exalted irritability and increased action of the motor nerve.

This activity is evidenced by muscular contraction occurring with quick changes or enduring, as clonic or tonic spasm; the latter does not, however, originate in a persistent influence exerted upon the motor nerves, but as Edward Weber's[1] experiments with the rotatory apparatus have shown, in a succession of shocks communicated to the motor nerves. He states that if the galvanic shocks communicated to a muscle or its nerve, be repeated so rapidly that the contractions which ensue, in spite of their short duration, follow one another in such immediate succession, that the succeeding one commences before the preceding one has ceased, the contraction of the muscles becomes persistent and so perfectly continuous, that even with the microscope we are unable to perceive the movements and tremors of individual muscular fibres.

The muscles of animal life, which are under the dominion of the cerebro-spinal nerves, and the muscles of organic life which are controlled by the sympathetic system, exhibit the peculiar type of their movements in the spasmodic contractions not less than in the healthy movements; in the former we see the muscular fibre at the same time uniformly and contracted throughout its extent, while in the latter we find successive contractions in wavelike progression. Although, however, the fundamental type is preserved, we meet with deviations in duration and locality; in spasmodic action of the heart the ventricles contract several times before a contraction of the auricles takes place, and the rhythm of the contraction itself is irregular.

[1] Ed. Weber; Ueber Muskelbewegung,—in Wagner's Handwörterbuch der Physiologie, vol. iii, p. 11.

The cycle of the spasmodic labour-pains is different from that occurring in normal labour; the pain attains its climax suddenly, at which it remains for a considerable time, and then subsides quickly. The contraction of the uterus is effected partially and irregularly. In intestinal spasms the waves of the movement very often recede and cause anti-peristaltic action. The organs possessed of a sphincter are not unfrequently attacked with spasm, in which the normal antagonism to their contractions is removed; thus we find a desire to micturate in combination with ischuria, and tenesmus associated with a desire for defecation.

The relation of the stimulus to the excitement varies in the sphere of motility according as the stimulus acts upon the peripheral tracts or the central organs. In the cerebro-spinal nerves the excitement is of equal duration with the irritation; the spasm in the muscles commences coincidently with the introduction of the galvanic current, and ceases at the moment at which it is interrupted. Those muscles alone are shortened whose nerve-fibres are distributed below the point of irritation. When the ganglia and nerves of the sympathetic are irritated the effect is generally unsatisfactory; but where it occurs, (as in the experiments in which Weber applied the electric stimulus to the aortic plexus without injuring the peritonæum,) the movement, both in extent and duration, is much less dependent upon the influence of the stimulus; the small intestine and the colon, which are in a state of complete rest, at the time when the current commences to flow, become affected with general and rapid movements, which continue long after the current has been withdrawn.[1] The spinal cord exhibits its reaction to the stimulus by the excitement of all nerves which pass off at or below the point of irritation; at the same time there are certain features which mark it as a central organ. First, the irritation may also extend above the injured part; galvanism applied to the inferior termination of the spinal cord of animals excites spasms not only in their hind legs, but also in muscles of the trunk and the fore legs. Secondly, the effect continues for some time after the stimulus has been removed; the rigor produced in living animals by applying the poles of the rotatory apparatus to the spinal cord, continues for some time after the

[1] Loc. cit., p. 51.

current has been interrupted. Thirdly, the motor action of the spinal cord may indirectly be excited by the stimulation of sensory nerves, giving rise to the contractions of the muscles known as reflex movements. The *brain* contains some structures possessing a motor influence, which manifests itself in a peculiar manner. Thus Weber found that whenever he connected the corpora quadrigemina in frogs with the rotatory apparatus, a constant change of movements ensued, which at one time seemed regulated by a purpose, at another presented the appearance of irregular clonic spasms.[1]

The form of the spasmodic movements differs according as the peripheral tracts or the central organs are irritated. When the trunk of a motor nerve is irritated, the co-ordinating action is absent, the muscles supplied by the branches of the nerve all contract without order or regularity. The irritation proceeding from the central organs cause a combined action, the various groups of muscles mutually assisting each other. The antagonistic movements take their origin in the spinal cord, from which the excitement of antagonistic contractions, as well as of associated movements, proceeds; in the former case we have flexion and extension, opening and closing, adduction and abduction, alternating with one another as in chorea; an instance of the latter is afforded by spasmodic asthma. Experiments made upon living animals have demonstrated that certain parts of the brain serve to regulate the movements; and that when they are subjected to irregular irritation, the balance is destroyed, and the body is cast in definite directions. The progress of physiology has thus served to contribute essentially to our knowledge of spasms, which formerly did not extend beyond the distinction between those of a clonic and those of a tonic character.

This is the basis for our division of the hypercineses:

1. Spasms resulting from irritation of the motor nerves, as conductors.

2. Spasms from irritation of the central organs, the sympathetic ganglia and plexuses, the spinal cord and the brain.

We possess but few observations on the alterations occurring in muscles in consequence of spasm. Bowman[2] is the first

[1] Loc. cit., p. 16.

[2] Philosophical Transactions, 1841, p. 69.

who has investigated the subject accurately. He found some muscles in tetanus perfectly healthy, whilst others presented a peculiar pale grey appearance in many parts, like the flesh of fish, doubtless owing to the blood having been squeezed out of the vessels. In other parts, again, they had almost lost their fine filamentous structure, and presented a soft spotted mass, which easily tore or retained the print of the finger. Extensive ecchymoses were frequently met with, which contrasted with the pallor of adjoining parts. Under the microscope the primitive fasciculi here and there exhibited the characteristic signs of a high degree of contraction, fusiform swelling, and a closer approximation of the transverse striæ than usual. In other parts the primitive fasciculi were deduced in size, and the transverse striæ were either far apart, or had disappeared entirely. In many parts they had burst with the sheath. In the annals of surgery we meet with instances of rupture of considerable muscles with hæmorrhage, occurring in tetanus. Hypertrophy of the muscles, such as we find in the muscles of healthy individuals, as a result of long-continued exercise and labour, is also met with as the result of frequent spasms; *e. g.* in the sterno-cleidomastoid, which Bell, in one instance, found enlarged to the size of the biceps. It is not improbable that hypertrophy of the heart is frequently brought on by long-continued palpitation, in the same way as spasm of the bladder superinduces extreme thickening of the muscular fasciculi of the organ. It is important to distinguish the contraction occurring in the spasm, which is a proof of the activity of the muscle, from the contraction which occurs from a permanent shortening of the muscle. A careful observation of clubfoot, of squinting, and analogous conditions, proves that the muscular affection may be isolated from the nervous irritation to which it owes its origin; a circumstance to which Stromeyer has drawn attention.[1] The indirect effects of spasmodic contractions of the muscles differ according to the parts into which the muscles are inserted. If they are of a nature to permit free movement, movement will result, as is the case with the tongue, the eye, and articulated bones. In membranous and hollow organs, which are more attached to the surrounding parts, the spasm causes the contents of the cavity to be expelled, as in

[1] Beiträge zur operativen Orthopädik; Hanover, 1838, p. 12.

the case of the pharynx, intestine, or bladder; or again it closes the channels, and prevents the ingress of substances or the discharge of the contents, as in the larynx, the bronchi, or the uterus.

In examining the relations of the motor nerve to the other nervous functions in spasms, our attention is first attracted to its bearing upon sensibility. The perception of muscular action, which renders us conscious of movement, of rest, or fatigue, also occurs in spasms. After an epileptic attack the patient complains of pain and fatigue in his muscles. The healthy individual requires to direct his attention especially to the point, in order to isolate one muscular movement in a complex of movements, *e. g.* in the act of respiration; we find the same to be the case in spasmodic states; and what in them has been generally attributed to habit, should rather be set down to an absence of acute attention. This is remarkably manifested in co-ordinated spasms, in which muscular movements and fatigue are borne to an extent and for a period, such as the strongest healthy individual would be unable to sustain; but even in this case, the sense of fatigue and the desire for rest at last prevail. It is different when a contraction of the muscular fibres has remained as a residue of former spasm; no fatigue is then felt, even under considerable excitement, and though the condition may continue during the whole life. Pain is caused in spasms either by the simultaneous irritation of sensory fibres; or by a mechanical irritation of the nerves appertaining to the muscle or passing through its tissue, by the contraction. The last is the case in cramps of the calves of the legs, which are accompanied by a sensation of dislocation, and in spasm of the sphincter ani; the former occurs in the spasms accompanying spinal meningitis and in the spasms of the lower extremities, brought on by dragging and pressure of the uterus or the intestines upon the sciatic plexus. The convulsions are not unfrequently preceded by hyperæsthesia, affecting the cutaneous nerves, the sympathetic, or the nerves of special sense, and known by the term aura; it is commonly met with as a symptom that precedes hysterical and epileptic fits. Pain is a much more frequent result of spasms than anæsthesia, and is owing to the compression of sensory nerves exerted by the contraction of the muscles. I have met with one case of anæsthesia of the arm brought on by spasm of the sterno-cleidomastoid and the scaleni.

The relation of the spasms to the intellect varies according as they depend upon an irritation of the motor nerves as conductors, or of the central organs. In the former case we meet with no psychical changes, however long the spasm may last; in the latter it is rarely absent, whether it manifest itself as an absence of the perceptions and decay of the mental powers, as in epilepsy; or as a subjugation of the will, as in hysteria; or a state of exaltation or aberration, as in the co-ordinated spasms.

The relation existing between spasmodic action and nutrition is manifested by phenomena occurring in the organs of circulation and in the secretions. A mechanical influence from compression of the vessels, and especially of the veins, is often produced by the rigid contraction of the muscles; thus the jugular veins are compressed by spasms of the muscles of the neck (see the chapter on Epilepsy); the consequence of this interruption to the circulation is a livid hue and the rupture of small vessels, as we meet with in the subcutaneous vessels of the leg, in cramps of the calves, or in the face in epileptic seizures. The skin and the kidneys are the secreting organs most liable to be affected. The copious, colourless, limpid urine, remarkable from the small quantity of its solid constituents, which is discharged in hysterical paroxysms, has been termed spasmodic. The perspiratory glands of the skin secrete more copiously; most freely in tetanus, when the temperature has fallen. In many spasmodic affections certain glands are peculiarly prone to excessive secretion, as the lachrymal glands in hysteria, and the salivary in hydrophobia.

Next to the excited action in spasm, it is important to examine the relations of motor excitability. Like the sensory excitability it may be exhausted by over-stimulation; this accounts for the intermission of the spasms, notwithstanding the continuance of the irritation. This exhaustion is either permanent, and paralysis and death ensue, as often happens in the spasms resulting from abnormal excitement of the central organs; or it is a temporary condition, and supplementary aid is rendered by the central organs. The exaltation of the irritability in cramps is recognised in the fact that discharges of the motor power take place spontaneously as well as upon the application of a stimulus; of this we have well-marked instances

in the reflex neuroses, hysteria, tetanus, and hydrophobia. The irritability is not, however, altered in the paroxysms only, but also in the intervals, as we have already demonstrated to be the case in the hyperæsthesiæ, (see Chapter II, p. 7.) Thus most choreic patients are unable to execute a single intended movement by itself; sympathetic movements are superadded, and the spontaneous movement passes into a chorea spasm. In epilepsy and hysteria, the longer the duration of the disease, the abnormal excitability more and more pervades the entire economy, and alters the normal relation to stimuli: we shall examine the individual features, which yet demand a more careful investigation, in the analyses of these diseases.

We know but little of the anatomical characters presented by the nervous system in spasms. The scanty knowledge we possess, we owe to recent researches; we may allude to the examination of the centripetal tracts in tetanic affections, and of the brain in static spasms.

The etiology of spasms is as yet very defective; in too many cases the most careful examination does not suffice to determine any special influence. In contradistinction to neuralgia, we find a predisposition to exist in infancy, as also in youth and middle age; the female sex are predisposed even before puberty, as in regard to chorea. There are only certain forms which chiefly affect the male sex, as stammering and ruminating. Hereditary influences are frequently at work, particularly with regard to epilepsy, hysteria, and stammering. The processes of evolution, dentition, and puberty, are a fertile soil. Climatic and endemic influences favour the development of tetanic affections, spasms of the glottis, &c. There can be no doubt that there may be a predisposition to spasms in the nerves themselves; those that in health are not affected by a mental or reflex stimulus are rarely attacked, as for instance the auricular branches of the facial; whilst the nerves that in artists or mechanics have been developed by special practice of a part, are liable to become the seat of spasmodic action. In the reflex spasms a relation of certain sensory or centripetal nerves to certain motor tracts may be observed to exist, as we find to be the case in healthy reflex action. If, in children whose scrotum is relaxed, we press the finger upon the inner surface of the thigh, the testicle of the same side is drawn up, in consequence of a reflex action from

the cutaneous branches of the crural nerve to the motor nerve of the cremaster. If the finger be applied more firmly, more rapid or decided movement ensues, and the retraction of the cremaster keeps time with the pressure. If the experiment be made alternately on both sides, the movement may be excited more frequently than if by constant repetition on the same side, the irritability is exhausted. Tickling the root of the tongue causes retching, and irritation of the pharynx gives rise to the movements of deglutition. Thus spasm of the face and spasm of the glottis are produced by irritation of the dental branches of the fifth pair, strabismus follows irritation of the intestinal nerves, respiratory and œsophageal spasm is brought on by irritation of the uterine nerves. Psychical influences are a fruitful source of spasms. The effect of the imagination on seeing spasmodic movements, and even the mere recollection of them, may give rise to convulsions; this is still more the case if the mind be strongly directed to the subject, as in the case of palpitations of the heart; the most effectual cause is emotion, and especially fright. Finally, among the causes affecting the nervous tissues themselves, irritation of the peripheral and central organs by external injuries (traumatic tetanus), as well as by diseases of the membranous and osseous envelopes, are not to be overlooked. A most important causal nexus exists between spasms and the normal stimulus of the motor nerves, the blood. For a long time plethora and congestions of the central organs were looked upon as the exclusive sources of spasmodic action; a great advance has been made in our days, by establishing the etiological claims of anæmia, which, as in the female sex, is often of an idiopathic character or a secondary affection, resulting from hæmorrhage or other fluxes. Some foreign substances, which become mixed with the blood, some of which possess a specific influence, demand a consideration; strychnine, ergot, and volatilised quicksilver, act upon the spinal cord, the poison of hydrophobia upon the medulla oblongata, lead, narcotics, alcohol, and exanthematic contagion upon the brain and spinal cord. Dyscrasic states of the blood and the diseases dependent thereon, impetiginous diseases, trichoma, &c., promote the origin of spasms; the arrest of secretions from the blood by means of the glands, especially the kidneys, belong to this sphere.

A special relation exists between the rhythmic spasms, which have as yet met with little attention, and which are isochronic with the pulse, and the arterial circulation. Some years ago, my attention was first directed to this point in a female patient, who applied for relief in the hospital that was under my superintendence. It was a woman, 48 years of age, who had formerly been a devotee to gin-drinking, in consequence of which her digestion had suffered; from time to time, she was affected with violent palpitations, and these were accompanied with convulsive movements of the left arm, which were exactly isochronic with the beat of the heart. As the palpitations subsided, the number of the convulsive jerks of the left arm were reduced in exactly the same proportion. During the intervals, the patient found the affected arm weaker than the healthy one, although the pressure of her hand was still vigorous. The impulses of the heart proved, on examination, to be moderately increased, but the pulsation of the right carotid was much more visible and marked to the touch than that of the left. The employment of the acetum digitalis, for eight days, was followed by a remission of the morbid symptoms, though we are unable to vouch for the permanency of the cure, as the patient withdrew from observation. At the time when she presented herself, the experiment of compressing the carotids had not yet been suggested; otherwise, this case would have been peculiarly adapted to this proceeding. I was the more interested in meeting with a case observed by Parry, which will be communicated in detail in the chapter on Epilepsy. In this instance, vibrations of the left forearm occurred, varying in frequency, though with tolerable regularity, and generally about eighty in the minute, like the pulse. They increased in frequency and intensity, if the individual exerted himself or became heated. The pulse of the carotids was very full and strong. Parry predicted that pressure on the right carotid would remove the paroxysm, but that pressure upon the left would not affect it; and so it happened each time compression was exerted. The irritation caused by living organisms within the human body, is a not unfrequent cause of convulsions; the influence of worms has formerly been over-estimated, and the fœtus has been too little regarded, as the silence of older authors with regard to the chorea of pregnant women proves. It is frequently caused by sexual over-excitement, by masturbation,

and in the female sex by exciting and unsatisfactory coition. Changes of temperature, sudden cold after previous heat, is apt in itself to produce tetanus, and the tendency is increased by the existence of wounds.

The prognosis of spasm is determined by the seat of the irritation. When a few peripheral tracts only are involved, the danger is less than when the central organs are affected; as an example, we may point to simple trismus as opposed to trismus accompanying tetanic affections, to spasm of the œsophagus, as opposed to hydrophobic dysphagia. When the peripheral affection becomes central, the danger is imminent; this is the case when spasm of the glottis passes into convulsions, or when eclampsia supervenes upon spasmodic labour pains. The prognosis is rendered unfavorable by a repetition of the paroxysms, as the conduction of the motor fibres is increased in proportion to the frequency of their stimulation. In forming a prognosis, we must also take the effects of the spasms into consideration, *e. g.* the obstacle to the admission of air in spasm of the glottis, the retention of urine in spasm of the neck of the bladder. We must not mistake for cures, the intermissions which occasionally take place for a considerable period, owing to the eruption of a new disease, or during pregnancy and lactation, or at the commencement of new modes of treatment, from the psychical influence that is exerted.

The spontaneous cure of spasms is induced by a resolution of the morbid condition in which they originate, or by a translation to the sphere of nutrition, accompanied by critical phenomena, such as hæmorrhage, cutaneous eruptions, or ulcers; or the cure may be brought about by the natural processes of development or decay of the organism, dentition, puberty, and decrepitude.

In regard to the treatment, we must first attend to the indication of removing the cause; by which means, we at times obtain the most brilliant results, as demonstrated by the cure of the spasms that take their origin in toxic influences, in dyscrasic states, or in reflected irritation, or even by the diminution of the frequency of certain affections, *e. g.* traumatic tetanus. Yet the therapeutic effect is, in many cases, very limited, owing to the imperfect state of our knowledge, or to our being unable to reach the cause; and even when we have removed the cause, the altered irritability, which has its seat in the central organs, continues to present an impediment. To

reduce this irritability to the healthy standard, is more easily done by regulating the diet and regimen than by drugs, a fact which the history of epilepsy and hysteria sufficiently proves. It is here that the cold applications so much in vogue at the present day are of utility. The relation of the nerves to the blood should be especially attended to. Great caution should be exercised in taking blood profusely or frequently from patients subject to spasm, even when plethora is present; epileptic subjects become obtuse more rapidly, and tetanic patients die sooner. It is only under certain circumstances that we can expect any beneficial result from such treatment, as after the suppression of habitual hæmorrhages and in puerperal eclampsia. We may expect more from an arrest of the supply of blood, as Parry has first attempted by compression of the carotids, a subject to which I shall return in speaking of epilepsy. In anæmic patients affected with spasmodic diseases, tonics, and especially steel, are imperatively demanded. The antagonistic system of treatment by means of derivation to the intestinal canal or the skin, dates back to old times; nor can it be doubted that we may achieve a cure by establishing cutaneous eruptions and ulcers. Finally, the statics of motor excitements, and their relation to sensory and psychical irritability, afford us an indication for the treatment of spasms, which, if conducted with ingenuity and intelligence, may be expected to yield very satisfactory results. The withdrawal of the stimuli of the senses, as the stimulus of light, operates beneficially; hysterical convulsions often cease rapidly when the eyes are bandaged. The calm obtained by narcotic agents, though generally but palliative, need scarcely be alluded to. We often have opportunities of satisfying ourselves of the salutary effect produced by opposing a mental effort to reflex action.

When this rational mode of treatment affords no relief, the use of empirical remedies is justified, if their value has been tested by experience. Of these, the metallic preparations, iron, zinc, silver, copper, and arsenic, have been shown to merit our confidence. For certain forms of spasm, modern surgery has introduced myotomy, a proceeding which not only removes the residuary effects of spasm, contraction of the muscle; but may also exert a beneficial action in calming the nervous irritation during the persistence of the spasm.

CHAPTER III.

SPASMS IN THE RANGE OF THE FACIAL NERVE.

HISTRIONIC SPASM OF THE FACE.[1]

Mimischer Gesichtsschmerz.—Tic convulsif.

Experimental Results.—In the living animal every stimulus applied to the facial nerve, whether mechanical, chemical, or galvanic, induces contraction in the muscles of the face, supplied by the irritated fibres. By isolating the irritation, and continuing it to single twigs or divisions of the nerve, the contraction may be limited to a single muscle, or even to separate layers of the same muscle. The irritation itself, as Backer, Eschricht, Müller, and others have observed, is painful; yet this sensibility is only of an associated character, caused by the union of a branch of the vagus with the trunk of the facial in the Fallopian canal, and chiefly by the apposition of its final distribution to fibres of the fifth; Magendie[1] has the merit of having demonstrated them, and proved their difference in animals.

I am unable to delineate the histrionic spasm of the face more accurately than by stating that it is characterised by alternating or permanent grimaces of one side, or, more rarely, both sides of the face. In the former case, elevation and depression of the occipital and frontal muscles, corrugation of the eyebrows, winking or closing the eyelids, jerking or snuffling with the nostrils, distortion of the angle of the mouth, are the prevailing features which supervene suddenly, disappear rapidly, and return after short intervals. The permanent contraction of the muscles of the face is much less frequent, and has only in our days been brought to our knowledge by some

[1] Leçons sur les Fonctions et les Maladies du Système Nerveux, vol. ii, pp. 170, 182, 191.—[See Note, page 46. Ed.]

observations of Dr. Marshall Hall.[1] The enduring contraction of the muscles of expression, renders the furrows and dimples on the affected side deeper; the tip of the nose, the commissure of the lips, and the chin are drawn over to the affected side; the muscles feel tense and hard, and render movement difficult, so that the corresponding eye cannot be closed with the same facility as the other.

In the play of the features during speaking and laughing, the distortion of the features becomes more apparent. The will generally has but little influence upon preventing or modifying the attacks; and even the limitation of the influence of the will to separate branches of the facial nerve appears impaired, by which means we may account for the sympathetic movements. Whenever Dr. Marshall Hall's patient attempted to close his eyelids, the angle of the mouth was drawn down, and his nose and chin were dragged to the same side. In the other case the patient was unable to move the right angle of the mouth without at the same time closing the upper eyelid.

The state of sensibility of the face varies. At the commencement the spasm is often associated with painfulness.[2] This ceases subsequently, and the patient has no sensation whatever of the tonic contraction of the muscles, however long it may endure. At times the sensibility is more obtuse than in health.

The spasm affects the entire range of the facial nerve, or only some of its branches. Blepharospasmus and risus caninus present us with instances of the latter variety.

Spasm of the eyelids (blepharospasmus), caused by an affection of the palpebral twigs of the facial, is characterised by twitching of the orbicular muscle, which may only affect single bundles of its fibres, and especially those which cover the tarsus of the lower eyelid; or it manifests itself by a rapid opening and closing of the eye, (winking, nictitatio,) or again it occurs in the shape of a rigid, firm compression of the eyelids, which is apt to give rise to ectropium, if a forcible attempt be made to open them.

[1] On the Diseases and Derangements of the Nervous System; London, 1841, p. 342.

[2] See Bellingeri de Neuralgie Faciei, in his Dissertatio Inauguralis, August. Taurin. 1818, pp. 212—224

The risus caninus (spasmus cynicus, γέλως σαρδωνικός,) is caused by the disease occupying the malar or labial branches of the facial nerve, and induces a movement and position of the lips, resembling laughing on one or both sides of the face.

It is most rare to find the spasm proceeding from the auriculo-muscular branches of the facial. Hitherto I have only met with one case of the kind, which presents itself vividly to my recollection; it occurred in a woman aged 49, who was attacked twenty-seven years ago with apoplexy, accompanied by paralysis of the right arm. Her recovery was slow and imperfect; weakness of the arm, and headache, show the persistence of a cerebral affection; at the same time spasmodic movements of both ears occur several times every day, and especially after emotions, during which they are drawn up and down with great rapidity for five or ten minutes at a time. The spasm is always accompanied by loud tinnitus aurium. No convulsive movements are met with in any other parts of the body. In another case I saw cramp of the ears precede the epileptic seizure, and thus take the place of the aura. The great rarity of auricular spasm in man accords with the fact of these nerves being withdrawn from the influence of the will in man. It is a different case in mammalia, whose auriculo-muscular nerves are more numerous, as they have to supply seven more muscles than the human species possesses. This renders the ear so expressive a feature in animals, and in them enhances the importance of the indications of disease, derived from its movement and position; even hemiplegia is characterised in them by a flabby pendulousness of the external ear of the paralysed side. Histrionic spasm of the face occurs uncomplicated, or in combination with convulsive affections of other nerves,—the lesser portion of the fifth, the hypoglossus, the accessory, or the spinal nerves.

Spasmodic distortion of the face is to be distinguished from paralysis, by the side which is not distorted maintaining its motility perfect, the reverse of which is the case in histrionic paralysis. Occasionally, though rarely, facial spasm originates in facial paralysis, of which Marshall Hall[1] has communicated an instance.

The disease is either seated in the peripheral or central part

[1] Loc. cit., p. 347.

of the facial nerve. Only a few of the causes to which it can be attributed are known. Occasionally it is referable to the contact of extreme cold, or of a cold current of air impinging upon the nerve in its passage through the face, and especially upon the palpebral branches. Under such circumstances, rheumatic affections of other parts may be associated with the spasm. I have been informed of one case in which the irritation caused by an inflamed gland in the vicinity of the stylo-mastoid foramen gave rise to the spasm. Causes affecting the facial nerve within its osseous capsule, or at the basis of the brain, and exciting spasmodic action, have not yet been discovered. Among the more frequent causes, reflex irritation deserves a prominent place. The old Greek physicians assumed a relation to exist between risus sardonicus and wounds of the diaphragm. It not unfrequently occurs in tetanus (risus tetanicus). Thus it may be excited by itself by any centripetal irritation, and in this respect the tract of the fifth nerve demands attention. Centripetal irritation either reaches the brain directly, and is converted into a conscious perception, or it is confined to the spinal cord, and the patient remains unconscious of it. The former case is illustrated by the spasm of the eyelids caused by a grain of sand being introduced into the eye, or by mechanical injuries of the organ, and frequently preventing the removal of the foreign body. Persons whose eyes are provided with scanty brows and pale lashes, or whose lashes are destroyed, and are therefore exposed to greater irritation from the light, frequently suffer from nictitatio, and photophobia is commonly associated with blepharospasmus. Thus histrionic spasm often accompanies tic douloureux; but though the sensory irritation may not be perceived, its source may be occasionally discovered, as in the following case recorded by Mitchell :[1]

A female, 50 years of age, was suddenly attacked with spasms of the facial muscles and the tongue, which, after the lapse of a fortnight, extended to the neck. The paroxysm commenced with a sense of weakness and oppression at the præcordia, and a violent shooting pain passing from the sternum to the spine, rising upwards to the tongue, which then became as stiff as a piece of wood, bending the point upwards to the left side of

[1] Medico-Chirurgical Transactions, vol. iv, p. 25.

the arch of the palate. A sense of numbness attacked the left side of the nose and the chin. The left angle of the mouth was opened and was distorted, the teeth were closely compressed, all the muscles of the face became rigidly contracted, the nose was drawn over to the left side, and the forehead and eyebrows were corrugated by the spasm of the occipito-frontal and corrugator supercilii muscles. The muscles of the neck rotated the head to the left shoulder, the left arm became extended, and a sense of numbness ran down in a straight line from the neck to the thumb and forefinger. Consciousness and the action of heart and lungs continued unaffected. After three minutes there was a remission, commencing with a tremor of all the affected muscles. These paroxysms returned day and night, at short intervals of ten minutes. As the treatment pursued produced no effect, another physician was consulted, who had seen a similar case of facial and lingual spasm cured by the extraction of a carious tooth: on examining the teeth of this patient, though she did not complain of toothache, one tooth was found in the upper left row to be in a morbid condition, and sensitive to the touch. The gum was inflamed, and a fetid matter was discharged. After the first molar was extracted, and the gums had been scarified, the paroxysms diminished in intensity and frequency, and entirely ceased after the extraction of all the carious teeth.

In this case the centripetal influence proceeded from the fifth pair, in others it arises from the intestines, and thus helminthiasis occasionally gives rise to blepharospasmus in children. The irritation sometimes originates in the uterus, and I have seen the risus caninus strongly marked in the hysterical paroxysms of several patients who presented a trichomatous cachexia.

It is rare to meet with central causes of facial spasm. In antiquity a variety of ranunculus, termed by Dioscorides Herba sardonia, and by Linnæus, Ranunculus sceleratus, was supposed capable of producing a state of intoxication, which, on account of its causing a sardonic distortion of the mouth, was called apium risus; modern observation has not confirmed the fact. Psychical influences occasionally act as exciting causes; thus I am acquainted with an instance in which the disease affected a female, in consequence of the fright caused by the sudden

death of her husband; emotions, however, are not the only influences of the kind, but the power of imagination and imitation may also give rise to it, though this is more frequently assumed than demonstrated. Spasm of the face very rarely depends upon disease of the brain, excepting the variety which accompanies epileptic seizures. Six years ago I had a robust man, of 36 years of age, under my care, who, after a powerful mental emotion, was attacked with paralysis of the left side in a slight degree. The muscles of the face and the arm were particularly affected, as well as the articulating movements of the tongue. The paralysis disappeared after the abstraction of blood and the administration of purgatives, but violent spasm set in, affecting exclusively the left half of the mouth and the platysma myoides; it persisted for four days and nights, and gradually yielded to cupping and tartar emetic, and the endermic application of morphia. With the strongest effort of the will the patient was not able to arrest the convulsive action for more than a few moments.

Chorea is frequently accompanied by facial spasm. In the majority of instances, however, it is impossible to discover any etiological relation, as little as we can discover any relation to age or sex. Pujol's[1] assertion, that men are more subject to this affection than females, has not been confirmed by the experience afforded by my own practice. The most common exciting cause of the attacks, and of their increased intensity, are emotional affections; and more particularly embarrassment of the patient when he thinks himself observed by anybody. In a case observed by Dieffenbach an intermission occurred during sleep.

The *treatment* of histrionic spasm of the face is generally ineffectual, owing probably to our frequent ignorance of the cause, as well as the neglect of the early stages of the diseases, which, especially in children, are generally misinterpreted as a bad habit. We are most likely to meet with success in the treatment of the spasm which originates in a rheumatic attack, and is confined to certain portions of the facial nerve. In rheumatic blepharospasmus, in addition to the suitable internal

[1] Abhandlung über diejenige Krankheit des Gesichts welche der Schmerzhafte Trismus genannt wird, nebst einigen Betrachtungen über den Hundskrampf des Cœlius Aurelianus, übersetzt von Schreyer; Nürnberg, 1788, p. 93.

remedies, much benefit is obtained from emetics, sinapisms, and blisters, applied to the point at which the facial issues upon the face, between the angle of the jaw and the mastoid process; these may be combined with the endermic use of morphine, when there is much tenderness of the surface. When there is reflex irritation, it is important to determine the centripetal source. When this is patent, as in traumatic affections of the eyes, ciliary neuralgia or ophthalmia, the method is easily determined upon. It is, however, more frequently concealed; still, our physiological knowledge of those nerves, which especially reflect irritation upon the facial, and not unfrequently accident, may lead us to the discovery. It is necessary carefully to examine the entire range of the fifth pair, especially its dental branch; the benefit we may thus gain has been shown in the case above detailed. In the same way the intestinal canal and the uterus must be examined to ascertain whether the irritation proceeds from there; it is equally necessary to determine whether the affection is based upon a dyscrasic state, such as scrofula, in order that full justice be done to the etiological relations. If we fail to gain our object in this way, as is often the case, or if no cause can be discovered, we still have the choice of operating upon the centripetal or the centrifugal functions of the nerves. The efficacy of the local application of sedative and other remedies is manifested in blepharospasmus, for which fomentations with a solution of borax (one to two drachms to four ounces of distilled water) are to be recommended. Formerly even division of single sensory branches of the fifth has been employed in facial spasm. Thouret, in an interesting memoir,[1] Sur l'affection particulière de la face, à laquelle on a donné le nom de tic douloureux, states that Guérin has divided the superior and inferior maxillary nerves a few times for convulsive tic, and that Moreau, in a case of spasm of the eyelids, has divided the frontal with good results. These cases are analogous to the experiments upon animals, in whom division of the fifth was followed by an arrest of the movements guided by the facial. In those cases which depend upon reflected irritation, we must, in the first instance, seek to exert a psychical influence, and thus control the facial by centrifugal action. The mind and the will should combat such conditions; it is upon this that

[1] Histoire de la Société Royale, années 1782 and 1783, p. 318.

what is called breaking a habit depends. Yet permanent improvement can scarcely be achieved, even at the commencement of the malady, if at all. It may be worth while, in very old cases, to employ electro-magnetism, and continued pressure by means of a small compress, applied according to the extent of the disease, either on the trunk at its exit from the stylo-mastoid foramen, or one of the divisions of the facial nerve. The division of the nerve would undoubtedly remove the spasm, but it would substitute paralysis. In order to avoid this evil and yet to attain the same object, Dieffenbach divided all the facial muscles. The case alluded to is that of a man, aged 43, who nine years previously, after passing from a room at a high temperature into a cold draught, had been suddenly attacked with twitchings of the orbicular muscle of the right side; they continued for a considerable period, but met with the less attention, as they occasionally remained in abeyance for some time, and in warm weather, and during the south wind, intermitted for whole days. They gradually extended over the entire right side of the face. While the left side bore the habitual expression of the individual, the features of the right side were constantly being shaped into new grimaces by the vivid play of the individual muscles, the forehead was corrugated, the trembling eyelids were thrown open and again compressed, and the right angle of the mouth extravagantly drawn up by the zygomatic and levator anguli oris muscles, which could then be felt like tense cords under the skin. When this happened it was impossible to continue a conversation, and speech, especially the labial consonants, failed the patient. He often suffered great inconvenience from his complaint, and could only relieve himself during a paroxysm by carrying the right hand rapidly to the cheek, and inducing a remission of the paroxysm by firm pressure and control of the affected muscles. On the other hand he was able to excite the twitchings spontaneously by attempting to close the eye by contraction of the orbicularis. Going to sleep was therefore attended with some trouble, and it was necessary to close the eye carefully and gradually. During sleep the muscles of the face were perfectly placid. Pressure upon the points of exit of the facial and infraorbital nerves neither increased nor diminished the disease. All the remedies previously employed had failed; the

patient was therefore very ready to submit to an operative procedure for the cure of his malady. A long-pointed fistula knife was introduced near the right angle of the mouth, passed under the mucous membrane of the cheek, and pushed up to the commencement of the margin of the lower eyelid. Dieffenbach then turned the edge to the muscles and severed them, while withdrawing the knife, but without in the least injuring the skin. This cut divided the lower portion of the orbicularis, and the zygomatici and levator anguli oris in the middle. The knife was again introduced at the external angle of the eye, carried through the mucous membrane under the integuments outwards, and in withdrawing it the orbicularis was once more divided. After each application of the bistouri, the abnormal movements diminished; the knife was therefore introduced once more through the mucous membrane of the upper lip, pushed up by the side of the nose in order to divide all its muscles, and especially the depressor alæ nasi.[1] The good effect which was the immediate result of the operation, has been almost entirely maintained. A year and a half after the operation a careful examination of the patient showed that the convulsions had entirely ceased, and that merely a tremor and agitation remained, especially affecting the orbicularis, but which was not to be compared with the former agonising spasm.

[1] Dieffenbach, über des Durchschneidung der Sehnen und Muskeln; Berlin, 1841, p. 314.

CHAPTER IV.

SPASM IN THE MUSCLES, SUPPLIED BY THE PORTIO MINOR OF THE FIFTH PAIR.

MASTICATORY SPASM OF THE FACE.—TRISMUS.

Experimental results.—Bell[1] was the first to prove the motor power of the lesser portion of the fifth pair; by irritating it in recently killed animals he caused the muscles of the jaws to move, so that the jaws closed with a snapping noise. Valentin[2] has repeated these experiments in the dead bodies of horses, cats, and rabbits, before they had lost their irritability; and succeeded in obtaining contractions of the muscles of mastication by irritating both the root and the separate branches of the third division as they enter the muscles. Volkmann[3] has confirmed these results, and has also observed that irritation of the fifth pair never causes the buccinator or the angle of the mouth to move, as Bell has stated to be the case.

The masticatory spasm of the face differs in form according as the nerves distend, for the different movements of the lower jaw are affected, and according to whether the spasm is of the tonic or the chronic variety. The nerves of the elevators of the jaw are most frequently affected, those supplying the masseter and temporal muscles; less frequently those of the abductors, the pterygoid muscles, and least of all those of the depressors, the mylohyoid, and digastric. The affection may be limited to one side, or it attacks, as is more commonly the case, both sides.

In spasms of the masseter and temporal muscles, the lower jaw is approximated to the upper, and in the tonic form remains fixed in this position, so that in the highest degree the teeth are firmly compressed, and cannot be separated by force (lock-jaw). The muscles themselves feel as rigid as a board. In the clonic form the jaws chatter, as in the cold stage of ague,

[1] The Nervous System, &c., pp. 28 and 83, 3d ed., 1836.

[2] Valentin; De Function. Nervor. Cerebr. et Nervi Sympathici, pp. 23—27.

[3] Ueber die motorischen Wirkungen der Kopf und Halsnerven, in Müller's Archiv für Anatomie, &c., 1840, p. 485.

and the muscles are seen to rise and fall forcibly. Bell[1] relates a case of this unusual kind of spasm; he was consulted by a lady who was reported to be affected with a remarkable disease, in the shape of pulsating tumours of the head and face. On examining her it appeared that there was violent spasm of the temporal and masseter muscles, causing them to swell and to rise; the jaws were so forcibly compressed as to dislocate the teeth. The play of the features continued undisturbed and unembarrassed. I have met with a similar case which I have related in the 'Klinische Ergebnisse,' p. 45, (1840.) The patient, æt. 65, had suffered from histrionic spasm several years previously, and had recovered from it gradually without any medical advice. After a gastric nervous fever she retained a chronic spasm of the masseters, causing a chattering of the teeth, which only ceased at night; towards evening it became so intense as to cause a concussion of the whole head. The right side was more violently affected than the left. If the hand was placed upon the cheek, the jerking contractions of the masseters were distinctly perceptible, whilst the temporal muscles and the muscles of expression continued at rest. There was no pain except when the spasmodic action was very intense. It deserves to be mentioned that the latter ceased during mastication. Clonic spasm of the abductor muscles of the jaw is characterised by grinding of the teeth and chewing movements; I am ignorant of its occurrence in the tonic form. In the few observations on record of spasms of the depressors of the jaw, it is described as assuming the tonic character. In a dissertation by Kirschner[2] the details of a case of epilepsy are given, in which a closed and open lock-jaw alternated.

The patient occasionally experiences a painful tension in the contracted muscles of mastication, but in the majority of cases no pain is felt. The masticatory spasm, like the histrionic, occurs by itself, or complicated with other spasms.

The affection may be confounded with diseases of the articulation of the jaw, and of adjoining parts which produce an immobility of the jaw. Thus we find a case in 'Bright's Reports of Medical Cases,'[3] in which anchylosis of both

[1] Loc. cit., p. 83.

[2] De Maxillæ inferioris divaricatione tetanoide; Berlin, 1825.

[3] Vol. ii, p. 418

maxillary articulations and ulceration of the articulations of the first and second cervical vertebræ, were accompanied by symptoms resembling trismus and tetanus. The painfulness of the joint which manifests itself on examination, the absence of muscular tension, and the longer continuance of the disease, afford sufficient diagnostic distinctions.

The causes affect the peripheral and central tracts of the motor portions of the fifth. The mere impression of cold upon the surface of the face may induce trismus.

A man of 43 years of age is under my care, who for the last four years, has been subject to a *dying away*, in a marked degree, of the upper and lower extremities, especially of the hands and feet, accompanied by numbness of the muscles; it is brought on immediately by exposure to cold. At the same time the masseters and the tongue become rigid, and a great difficulty of opening the mouth and swallowing supervenes. Sudden changes of heat and cold give rise to trismus; this form has hitherto been termed rheumatic, and has improperly been looked upon as a primary affection of the muscles. Generally speaking, the peripheral distribution of the motor portion of the fifth is less frequently affected in this way than the facial nerve; whereas it is more often implicated than the latter in diseases of the base of the brain.

On the 28th September, 1830, I was called to see an old woman of 74, who for seven months had suffered from hemiplegia of the left side, and chiefly of the arm, accompanied by anæsthesia. The day previous to my seeing her she had suddenly become apoplectic, and, as the friends stated, her teeth had from the commencement been so firmly clenched that it was impossible to introduce even liquids into the mouth. I did not find her comatose, but she was unconscious, and gave no evidence of understanding the questions addressed to her. Her head and neck were rigidly turned to the left side, and both eyes were immovably directed to one point. The trismus was so intense that no force was adequate to separate the teeth and the jaws. At the same time the entire left side of the face and a large portion of the right was insensible to every kind of irritation. The play of the features continued unimpaired. This condition lasted seven days, on the eighth sopor supervened, followed by death on the ninth. A few hours

previously the trismus ceased, and the patient swallowed about a table-spoonful of fluid. The post-mortem examination was made the day after, and exhibited considerable hypertrophy and ivory density of the cranial bones. An osseous concretion of the shape of the vomer occupied the anterior portion of the falx. There was copious albuminous exudation on the arachnoid, along the falx, especially in the vicinity of the vertebræ, where the three meninges were intimately adherent to one another. Many of the Pacchionian glands contained a calcareous concretion, and presented a rough and angular surface to the touch. The arachnoid was opaque, thickened, and in many parts rendered prominent by a gelatinous exudation separating it from the pia mater. The greater part of the arterial network at the base of the brain was ossified. In the medullary matter of the posterior lobe of the right hemisphere, there was a spot of softening of the size of a plum extending to the roof of the lateral ventricle. The medullary tissue at this part was perfectly pultaceous, whilst elsewhere it presented the ordinary consistency. The colour of the softened portion was of a dirty grey, traversed by a few red dots and streaks. There was a second spot of softening of the size of a cherry, and of a reddish-yellow colour, in the right thalamus opticus. Both peduncula cerebelli ad pontem, and the roots of the fifth pair on both sides, were softened, the latter so much so that they were perfectly diffluent. The ganglia Casseri were not implicated in the softening. The remaining cerebral nerves at the base of the brain presented the ordinary appearance and consistency. There was a considerable quantity of yellow serum in the lateral and third ventricles. A large quantity of fluid was discharged from the vertebral canal on lowering the head.

Trismus and grinding the teeth also accompany meningitis at the base of the brain, and masticatory movements occur in typhous and apoplectic diseases.

Of the causes of masticatory spasm, reflex irritation deserves to be especially mentioned. It is by no means an unfrequent occurrence to find irritation of sensory nerves, whether the patient be conscious of it or not, reflected exclusively by the motor portion of the fifth pair. The centripetal excitement may take place in the immediate vicinity of the nerves of mastication; but its seat is more frequently at a distance, in the

trunk or the extremities. Mr. Travers[1] has communicated a few instances of this. One was that of a young woman liable to hysterical paroxysms, who after the extraction of a lower molar of the right side, accompanied by splintering of the alveolar process, was affected on the following day by trismus: at the time when Mr. Travers saw the patient, the affection had already lasted three months. The masseter and temporal muscles of the right side were rigidly contracted. The patient was fed by an elastic tube introduced through an opening caused by the absence of a tooth. In other respects she was well. Subsequently chorea of the upper extremities supervened. In another case, the kick of a horse in the right inguinal region, had caused a tense circumscribed tumour in the hypogastrium, along the sheath of the rectus abdominis muscle. The patient was suddenly seized with trismus. The tumour was punctured, and half a teacupful of pus was discharged. The trismus diminished at once, and ceased altogether after a few days. Clarus[2] relates the case of a young and sensitive woman, who, during the seventh month of pregnancy, cut her left thumb with a somewhat blunt knife, the incision passing across the external side of the second joint, and penetrating to the tendons; it was not more than an eighth of an inch long. The wound gave much pain, but bled little and healed rapidly; a few days later, a sense of dragging and tension commenced in the left hand, and extended to the neck; a similar feeling now affected the muscles of mastication, the lower jaw could only be separated from the superior maxilla to the extent of about half an inch, and mastication became a matter of difficulty. This condition continued in a more or less marked degree for about four or five weeks, and yielded at last to the employment of baths and change of air; though a peculiar sensibility of the seat of injury, and a sense of tension in the wrist, continued for a considerable period. Not long since, I had an opportunity of observing the occurrence of tension of the masseters and impeded movement, and painfulness of the lower jaw of the right side, in a man labouring under fracture

[1] A further Inquiry concerning Constitutional Irritation and the Pathology of the Nervous System; London, 1835, p. 311.

[2] Der Krampf—in Pathologischer und Therapeutischer Hinsicht systematisch erläutert, 1 Theil.; Leipzig, 1822, p. 216.

of the right tibia and fibula; the affection came on on the tenth day after the injury, and disappeared spontaneously after a few days. Helminthiasis occasionally gives rise to trismus or grinding the teeth; the latter symptom also occurs as the reflex action propagated from the fifth pair, during dentition. Nor does trismus occur merely in the normal state of reflex action; it is even more frequent when this function is morbidly excited; tetanus generally commences with this symptom, and hysteria is frequently associated with chattering of the teeth, the clonic form of the masticatory spasm. Excepting reflex action, there are very few causes residing in the central organ, which give rise to trismus; we have, however, yet to mention epilepsy, in the paroxysms and intervals of which the spasm of the jaws not unfrequently occurs; at times, it accompanies intermittent fever. Graves[1] has adverted to the occurrence of grinding the teeth in gouty subjects, which may become so enduring and violent as to wear down the teeth.

The *prognosis* depends mainly upon the state of the reflex action. If this is exalted to a tetanic affection, trismus must be looked upon as one of the most fatal diseases; and it runs a more acute course, as we have detailed fully in the description of tetanus. But when the reflex action is not itself increased by a morbid state of the central organs, the trismus excited by sensory irritation is of little consequence, and corresponds in its duration to that of the centripetal stimulus; it then frequently becomes chronic. This point is of material importance in forming the prognosis, for trismus is generally looked upon as hopeless. Among the other varieties of trismus, that occurring in epilepsy is of least consequence; but when it supervenes upon inflammatory conditions of the brain, it indicates danger, as it evidences irritation at the base of the organ, in the vicinity of the medulla oblongata.

The main point to be attended to in the treatment of reflex trismus, is the removal of the sensory irritation, whether it be owing to the teeth, a wound, or the state of the stomach. Scarification of the teeth during the period of dentition operates beneficially in this way. In a paper on amaurosis following injuries of the brow, Von Walther[2] quotes a case observed

[1] A System of Clinical Medicine, vol. i, p. 465.

[2] In Graefe and Walther's Journal für Chirurgie und Augenheilkunde, 1840, vol. xxix, p. 525.

by Carron du Villard, in which trismus caused by the extirpation of an encysted tumour was removed by division of the frontal nerve. Earle[1] met with a case in which recovery ensued immediately upon the discharge of a tapeworm. When the cure is delayed, the local application of narcotic remedies, in the shape of ointments and plasters, is to be recommended. When there is a tetanic complication, the treatment appropriate to tetanus must be adopted. When trismus accompanies epilepsy, opium in enemata, or applied endermatically, proves effectual; of this I have seen one case, in which the treatment was followed by speedy cure. A widow, aged 37, who was married in her fourteenth year, was attacked in her fifteenth, after a laborious and artificial delivery, with epilepsy; to which she had since continued liable at irregular intervals. She only remained exempt during the lactation of three children, but the infants themselves died under violent convulsions. Several years ago, she was under treatment in a hospital, where, after an epileptic attack, trismus supervened, which continued for seventeen days, and then yielded on the extraction of some teeth, and the instillation of tincture of opium. On the 26th of October, 1832, while at market, she was subjected to great annoyance, in consequence of which she fell down in violent convulsions, and when they ceased she was affected with aphonia and trismus. On the following day, I found the jaws closely compressed, resisting every attempt to open them. The masseters resembled two thick cushions, while the muscles of the neck and the abdomen were free from contractions. I ordered one third of a grain of acetate of morphia to be sprinkled every three hours upon a blister on the thorax. After the third powder the voice returned, and after the fifth, the patient was enabled to open her mouth without the least difficulty. When there is an inflammatory condition at the base of the brain, the treatment suitable to meningitis is indicated.

[1] Travers, loc. cit., p. 298.

CHAPTER V.

SPASM IN THE RANGE OF THE NERVES OF THE EYE, THE OCULOMOTOR, THE TROCHLEAR, AND THE ABDUCENS.

STRABISMUS, NYSTAGMUS, SQUINTING.

The division of the muscles and tendons in strabismus has demonstrated the valuable assistance which may be rendered to the investigation of the physiological conditions of morbid states by an operation executed by reflecting and intelligent surgeons. Böhm's[1] excellent monograph is a strong proof of this statement. The point that concerns us most at present, the nervous influence, psychical and reflex, upon the origin and promotion of squinting, has also been investigated by this author. Nevertheless, the observations of the strabismus caused by spasm are as yet the least satisfactory, whilst the paralytic variety has been more fully considered and elucidated.

Authors have spoken of spasm of the muscles of the eye as tetanus oculi.[2] Considering the variety of origin of the motor nerves of the eye, it is more than doubtful whether an affection of this kind ever occurs. A single muscle, the rectus externus, is even supplied from a double motor source; one arising from the brain by the sixth pair, and one by sympathetic fibres coming from the superior cervical ganglion and lying in close approximation to the abducens. Spasm produces a uniform or irregular oscillation of the eyeball between the antagonising muscles, which has been termed nystagmus. The direction is commonly horizontal, between the external and internal rectus; very rarely, if ever, vertical; sometimes, as in a case related by Bell,[3] semi-rotatory. In the instance referred to,

[1] Das Schielen und der Sehnenschnitt in seinen Wirkungen auf Stellung und Sehkraft der Augen.; Berlin, 1845.

[2] See Ruete; Lehrbuch der Ophthalmologie, p. 635.

[3] The Nervous System, &c., 3d ed., 1836, p. 372.

the patient had lost his right eye; and the centre of the cornea of the left had been opaque for twenty years. This eye unintermittingly and spontaneously rotated to a semi-circle. The rotation amounted to a quarter of the circumference of the eye. The cornea approached nearer to the nose than usual, so that there was an appearance of strabismus. Demours[1] relates a similar case, affecting two brothers of from 30 to 35 years of age, who from birth had suffered from rotation of the eyeballs.

The term strabismus is applied to spasm affecting the muscles in both eyes or in one only, or alternately in either, by which the coincidence of the optic axis in one direction is prevented. The branch of the oculomotor supplying the rectus internus is most frequently affected, giving rise to strabismus convergens; less frequently the abducens (strabismus divergens), and least of all the branches of the oculomotor, which are distributed to the rectus inferior and superior; the last forms may be looked upon as exceptional, whilst the same nerves and the twig supplying the levator tarsi, which is not known ever to be spasmodically affected, are more frequently exposed to paralysis. We know least of all of spasm of the oblique muscles of the eye; although it may be assumed that in outwards and downwards squinting the trochlear nerve is affected, if we adopt the view expounded by Hueck and Volkmann that the oblique muscles are endowed with the functions of rotating the eye on its axis, which enables the rays of light reflected from an object to fall upon identical points of the retina, even when the head is turned to one side. The lower oblique directs the pupil in an arc, upwards and outwards, and the superior oblique outwards and downwards.[2] Finally there are spasmodic affections of the recti muscles, by which the bulb is retracted, and of the oblique, by which it is drawn forwards.

Nystagmus and strabismus may exist by themselves, or they are complicated with other convulsive affections, *e. g.* of the eyelids (nictitatio), of the trunk, with chorea or epilepsy.

The distinction between spasmodic strabismus and the paralytic form consists in this, that in the former the voluntary

[1] Dictionnaire des Sciences Médicales, vol. xxxv, p. 582.

[2] Volkmann; über die Motorischen Wirkungen der Kopf und Halsnerven,—in Müller's Archiv für Physiologie, 1840, p. 481.

movement of the bulb in other directions, though difficult, is not destroyed, whilst in the latter the movement by the paralysed antagonist is rendered impossible.

The etiology of spasmodic strabismus is yet enveloped in great obscurity; nor have the recent researches into the nature of the disease at all cleared it up. Peripheral causes are the least frequent; those hitherto observed were seated at the base of the brain. Thus nystagmus often accompanies meningitis of the base of the brain, especially in infancy.

In the month of February, 1833, I was called to a child of thirteen months, which, according to the statement of the mother had been affected with convulsions of the extremities immediately after birth, which had since occurred from time to time in a lower degree. The fontanelle remained open, the eyeballs were pushed downwards, so that the lower lid covered a portion of the pupil; there was no development of the intellectual powers. No doubt was entertained of the existence of hydrocephalus. Three weeks before death a new symptom occurred. There was convulsive action of both bulbs, which slid from side to side like the weaver's shuttle, the rapidity of the movement increasing as soon as the head was held in the erect position. Fever, sopor, instantaneous vomiting when the head was raised, and loss of sight supervened. Death ensued with violent convulsions, especially of the muscles of the eye. The post-mortem examination was made by Dr. Henle, at that time prosector at the university dissecting-rooms, and exhibited a brain that was much developed and might almost be termed hypertrophic; its consistency was dense and elastic. All the ventricles were distended to double their ordinary size, and filled with a reddish serum. There was a considerable plastic exudation at the base of the brain, pressing upon the chiasma of the optic nerves. The oculomotor nerves were imbedded in a gelatinous mass which adhered to them so closely that they could not be perfectly dissected out.

Strabismus occurs under similar circumstances, and associates itself with convulsive affections of other nerves, which are irritated at the base of the brain by an inflammatory process occurring in the meninges. The following case, which recalls to my memory a cure effected under very unfavorable circumstances, shows how the symptoms occurred in the order

in which the nerves are gradually drawn within the circle of irritation.

A boy of 3 years, plethoric, and endowed with a large head and a short neck, was attacked, in August, 1833, with croup, which was removed by the early administration of the appropriate remedies. Six weeks later the usual good spirits of the boy disappeared, and there was a dislike to standing or walking, and frequent complaints of pains in the feet. Restless nights and febricitation supervened. On the 30th September violent convulsions and unconsciousness suddenly occurred, for which a medical man, who was called up from the street, ordered a warm bath and musk. When I arrived, an hour later, I found the child in an apoplectic condition; the face was crimson, there was sopor, stertor, steaming skin, and a full frequent pulse. I ordered leeches, cold to the head, and copious derivation to the intestinal canal. The sopor yielded to considerable excitement and loud confused talking; the presence of vertigo was manifested by the constant cry—"I am falling off my chair!" The continued use of calomel, repeated abstraction of blood, cold affusion to the head, and a blister to the back of the neck, overcame the phrenitic condition, &c.; but in its place a state of unconsciousness and sopor supervened, which for twenty-eight days formed the background of convulsive scenes which were remarkable on account of the successive affection of the nerves seated at the base of the brain. At first the vagus was involved, and there was short dry cough, with suffocative attacks; then the facial nerve became implicated, as shown by the forcible expansion and contraction of the nerves and by distortions of the angles of the mouth; then the fibres of the fifth distributed to the muscles of mastication were involved, and there was a persistent chewing movement; after that amaurosis followed: when a lighted candle was held before the eyes or the finger moved close to them, there was no winking or other movements of the eye, although the pupils continued to act pretty well: lastly, the oculomotor became affected, and there was marked strabismus inwards and upwards. The other symptoms of meningitis continued all the time; sopor, inability to hold up the head, jactitation of the head and burrowing into the pillow, circumscribed redness of one cheek appearing and disappearing, grunting expiration, extension of

one leg, raising and swinging the leg however often it was put back under the bed-clothes, extreme emaciation, especially of the neck and back, falling in of the abdomen so that the ribs projected considerably, a dry, harsh skin, irregular breathing, a pulse of from 100 to 112 beats, and great torpidity of the intestines. It was in this case that the continued employment of moist warmth, by means of fomentations of the head, produced the most satisfactory results, which I have since found confirmed in several cases.[1]

The reflex influence upon the origin of spasm of the eye manifests itself when sensory nerves in the vicinity, or at a distance, are irritated. Thus it sometimes occurs when the eye is mechanically injured; and Jüngken[2] describes a spasmodic affection accompanying lacerated and contused wounds of the eyeball, by which the latter is drawn into the orbit, occasionally with such force that the conjunctiva forms a fold over the ball and that the cornea disappears altogether. The squinting that occurs at the periods of dentition affords a proof of the reflex action exerted by the fifth pair upon the motor nerves of the eye. Intestinal irritation, especially when produced by worms, is liable to give rise to strabismus. Nor is it an unusual occurrence in hysteria, where we find the external rectus chiefly affected; and it is this which, in a mild degree, is termed the false eye. Böhm had an hysterical patient under his care, in whom the spasmodic reflex actions, commencing at the feet, travelled through all the different groups of muscles, induced various distortions of the body, then attacked the face, and finally settled in the ocular muscles. For a long time there was strabismus convergens alternately on the right and left sides, the pupil in each case being so concealed in the inner canthus, that light only entered in at a small portion. The patient, who was perfectly conscious throughout, only complained of one inconvenience; as the associated movements of the eye continued, all objects to which she directed her undivided attention appeared double. The more distant the object,

[1] See Dr. Romberg's—Diagnostische und Therapeutische Bemerkungen über Hirnentzündungen im kindlichen Alter, in Casper's Wochenschrift für die gesammte Heilkunde; Jahrg., 1834, p. 499.

[2] Die Lehre von den Augenkrankheiten, 2 Aufl., p. 890.

the further the double images were apart, and the less they annoyed her.

The optic nerve is in a close reflex relation to the nerves of the ocular muscles; and the balance of the movements of the eyes is determined by condition of this relation. Thus we find a restless movement of the eyeball, accompanying an early interruption to the functions of the retina; nystagmus is the ordinary accompaniment of the congenital cataract, as well as of extensive leucoma, or staphyloma, resulting from ophthalmia neonatorum and ophthalmia variolosa. Minor opacities of the cornea or the lenticular capsule, give rise to strabismus convergens, while strabismus divergens is induced by paralysis of the retina in amaurosis. Spasmodic strabismus may also arise from causes affecting the energy of the optic nerve. A patient of 30 years of age, informed me that the squint with which she and her brother were affected, had supervened suddenly, when she was five years old, in consequence of her being brought out of a dark room into one brilliantly illuminated, on Christmas eve.

Among the exciting causes proceeding directly from the brain, those of a psychical character are the most frequent; emotions induce spasmodic squinting, and they may excite it in individuals in whom other predisposing influences may have caused a tendency to strabismus. Böhm, to whose work we must refer the reader for a fuller consideration of the subject, remarks:

"Individuals of this character, who do not excite any, or but trifling suspicion, even in an experienced observer are suddenly seized in a most remarkable manner, with the highest degree of one-sided strabismus, whenever they are vividly reminded of any deeply interesting subject, or they reflect vividly, or their emotions carry them out of their usual frame of mind, and embarrassment, mauvaise honte, shame, fear, or anger excite their central nervous organ." And again: "It appeared to me to be important to ascertain from the patients themselves whether, and in what manner, they were able to diminish or avoid the irregular position of the eyes, in order to determine more accurately the nature of the mental influence in squinting. Individuals accustomed to reflection were competent to return an answer to the inquiry. They state that they are

conscious of not possessing a direct controlling power in this respect; but that they are able to restore the eye indirectly to parallelism, in proportion to the facility with which at any given time they can regain perfect mental equanimity. With the view to avoiding the squint, they actually try, at times, to divert their thoughts, to turn a conversation which excited them into another, calmer channel, and the like."

The observations made in idiots offer an especial interest. Böhm, who was physician to an asylum for these unfortunate individuals, had many opportunities of watching them in their leisure hours, and invariably found their eyes straight; in a few only there was continued and permanent strabismus. He was, therefore, much surprised, when he first had occasion to observe them at their lessons, and saw that soon one and then another showed an egregious squint. This evidently occurred at such periods at which the visual impression passed beyond the boundary of mere sense and an inner perception commenced, the clearness of the mental act still, however, meeting with great impediments. In accounting for this phenomenon, we can scarcely refuse to admit that these difficulties predominated in one half of the brain, and that the squint occurred as a symptom of the internal process, which to us undoubtedly is obscure, but which it is not unreasonable to suppose connected with a different state of irritability in the portion of the brain less accessible to mental operations, which might cause an abnormally increased influence upon the motor nerves of the corresponding eye. This explanation is the more tenable, as the temporary squint of idiots occurs simultaneously with the first dawn of intellectual activity, so that Böhm was enabled by this symptom to judge of the exact point which the pedagogic influences had reached. In the same way as the brain increases in vigour, and the intellect is expanded, (*e. g.* from the low state of development in which they are capable of only emitting a few sounds, to the capacity of reflecting and conversing,) the squint becomes less frequent, and generally disappears in the course of time.

It has not as yet been determined whether morbid states of certain portions of the brain are followed by squinting, as in the case of injuries in living animals. In the experiments made by Krauss, Hertwig, Magendie, Budge, and others, lesions of

the cerebellum, the peduncula cerebelli, the pons Varolii, and the processus restiformes of the medulla oblongata, the eye of the same side was found to squint downwards and upwards, while the eye of the opposite side was rotated backwards and upwards, a phenomenon which is probably connected with the altered balance of movements caused by such injuries.

The type of spasmodic strabismus is, at times, of an uniform and constant character, as seen by Böhm in two instances. In one, that of a boy of 5 years, a quartan ague had preceded; at first, the strabismus took the place of the febrile paroxysm, after a few weeks it assumed the tertian, and subsequently the quotidian type. In the free intervals by day and at night, there was no trace of disturbed equilibrium. In the other case, which occurred in a child of 3 years old, the squint returned for several months, regularly on alternate days, and gradually disappeared; the squint still continuing for a time to manifest itself momentarily on the paroxysmal days; it was produced by slight emotions, as by the shyness caused by the appearance of a stranger, or when the child was out of temper, and this too ceased entirely after a time.

In choosing our treatment the cause of the affection must determine our selection. The spasm of the eyes depending upon intestinal or dental irritation, generally disappears with the removal of these conditions. In a boy, aged 12 years, the discharge of a quantity of ascarides and some lumbrici removed a nystagmus under which he was suffering. Inflammatory affections of the base of the brain require the treatment appropriate to them. The contraction of the squinting muscle induced by spasm demands surgical interference, and calls for myotomy or tenotomy.

CHAPTER VI.

SPASM IN THE RANGE OF THE HYPOGLOSSUS.

Experimental results.—Mechanical and galvanic irritation of the hypoglossus applied in the living or recently killed animal, induces jerking movements of the lingual muscles, which may be limited by isolating the influence in individual nerve filaments. Volkmann, in several experiments in which he carefully galvanized the rootlet provided with a ganglion, saw a movement confined to a small spot on the dorsum of the tongue, which recurred uniformly with each repeated irritation, and without in any way altering its character.[1] Irritation of the roots of the hypoglossus scarcely produced any effect upon the muscles of the neck (the omohyoid, sternothyroid, &c.,) supplied by the descendens noni. We may conclude from this that very few of its filaments are derived from the ninth, and the microscope has in fact demonstrated that the descendens noni mainly consists of fibres of the spinal cervical nerves, which mount upwards to unite with the hypoglossus to be distributed to the tongue.[2]

The movements of the tongue are twofold; they serve for the purposes of mastication and of articulation. The movements of mastication are destined for the formation of the morsel, and represent the first stage of deglutition, in which the materials are collected together in the morsel, and pushed between the surface of the tongue and the roof of the palate behind the anterior palatal arch. The articulating movements contribute to the formation of the sounds, from the combination of which speech results. The sounds are either produced singly or in a definite order, either dumb as mere noises, or sonorous with the co-operation of the voice.

Spasm of the tongue, with impeded masticatory action, be-

[1] Müller's Archiv, 1840, p. 503.

[2] Volkmann; Beobachtungen und Reflexionen über Nerven-Anastomosen, in Müller's Archiv, 1840, p. 512.

longs to the rarest occurrences, whilst paralytic conditions, which affect the same parts, are frequent enough. I have only a few times had an opportunity of observing convulsive movements of the tongue. In one female patient I found it to accompany hysterical paroxysms; the tongue was rolled about in the mouth, and produced a clacking noise. In the other case the spasmodic action of the tongue was associated with meningitis of the base of the brain in a child of 4 years. In the patient affected with prosopalgia, whose history has been detailed at page 37, convulsions of the tongue occurred whenever the pain attacked the lingual nerve. In two other cases the spasm of the tongue was associated with histrionic spasm of the face.[1]

The articulating movement of the tongue is very rarely interfered with by spasm; the impeded articulation of certain sounds, stammering (Dyslalia), which occurs not only in the sonorous, but also in the aphonic expression of these sounds in a whisper (vox clandestina), generally depends upon a paralytic affection.

[1] See the Case observed by Mitchell, p. 298; and Jos. Frank, Praxeos Medicæ Universæ Præcepta, t. iii, vol. i; Lips., 1830, p. 540.

CHAPTER VII.

SPASM IN THE MUSCULAR DISTRIBUTION OF THE NERVUS ACCESSORIUS WILLISII, AND OF THE SUPERIOR CERVICAL NERVE.

Experimental results.—Irritation of the accessory nerve at its entrance into the foramen lacerum in a recently-killed animal, causes contraction of the sterno-cleido-mastoid, and trapezius muscles.[1] These muscles, both or singly, (in the latter case more frequently the sterno-cleido-mastoid,) may be attacked with spasm; the older writers (Wepfer, Sauvages,) relate cases of the kind, but we owe a more accurate knowledge of the subject to the researches of Bell.[2]

The head is rotated in paroxysms obliquely to one side, either suddenly at once, or in short successive jerks, to such a degree that the ear is brought close to the shoulder, and the chin is elevated in the opposite direction. The sterno-cleido-mastoid muscle of the side to which the head is drawn down bulges out, and is tense. At times the head is bent more backwards, and the shoulder is raised, showing an affection of the trapezius, which may be felt as a hard cord. In most cases pain in the course, or at the insertions of the muscle, or at the nape or occiput of the affected side, accompanies the spasm. After a brief duration, generally but of a few seconds, the head resumes its normal position, in order soon again to quit it. By fixing the head and neck the patient is generally enabled to prevent the spasm, and even to arrest it after it has commenced. Occasionally he is even able to do it without such support. Bell[3] relates that a patient of his was able, when the paroxysm attained its climax, and the mastoid process had been drawn down to the sternum, voluntarily, though only

[1] Volkmann; loc. cit., p. 498.

[2] The Nervous System, 3d ed., pp. 415—423.

[3] Loc. cit., p. 415, Case CLX.

for a short time, to relax the muscle, and to maintain the head in equilibrium. During sleep the paroxysms generally intermit.

Besides the muscles mentioned there are others, as the splenii and obliqui capitis, which, receiving their motor power from the superior cervical nerve, are sometimes affected with the spasm, and cause a rotatory or oscillatory movement of the head and neck. Bell communicates a case in point, of a young girl whose head was rotated constantly day and night, and turned twenty-two times in a minute. The action producing this movement resided in the sterno-cleido-mastoid, trapezius, and splenius muscles, affecting alternately each side, and turning the head on the odontoid process of the second vertebra, as regularly as if it moved in obedience to a pendulum. I have observed a similar affection in a girl of 14 years, who enjoyed good health up to her eleventh year, and was then seized with histrionic spasm of the face. This gradually subsided, and for it a convulsive oscillation of the head, chiefly to the left, and less frequently forwards, was substituted. In fifteen seconds, I counted eleven gyrations of this character, which ceased altogether during sleep. In another case, the rectus capitis anticus seemed mainly affected; it occurred in an infant of six months, which had laboured under watery diarrhœa, heat of the mouth and head, and after these symptoms had disappeared, was attacked with a permanent swinging of the head forwards, like the Chinese idols. At times, especially when she woke up, the eyeballs were rotated upwards; during sleep the spasm was arrested, and it also ceased during waking, as soon as the child's attention was attracted to anything. Forcibly holding its head still, created restlessness and crying.

As a result of enduring spasm we meet with hypertrophy of the muscles, distortions of the face, descent of one side of the face, while the opposite one is drawn up, and even with dislocation of the bones of the face.[1] When the scaleni are implicated, I have occasionally, from compression of the brachial plexus, found numbness and anæsthesia ensue, as well as œdema from compression of the veins.

[1] Dieffenbach; über die Durchschneidung der Sehnen und Muskeln; Berlin, 1841, p. 24.

The convulsive affection of the accessory either occurs by itself, or in combination with other spasms; in this case, the muscles of the face, as also of the pharynx and the larynx, are most commonly affected.

The causes are obscure. In a few patients only, the origin was referable to violent bodily fatigue which had preceded to lifting a heavy weight, accompanied by a sense of cracking in the back of the neck, to a heavy labour, and the like. Others referred it to violent emotions, debilitating influences, draughts impinging on one side of the neck,[1] and rheumatic influences generally; the majority of patients, however, were unable to state any etiological moment with certainty, and described the spasm as occurring gradually. In the case of an old lady of 73, communicated by Stromeyer,[2] the spasm was associated with an extreme tension of the muscles of the calves, giving the feet the form of pes equinus; there had also been, for a series of years, a slight spastic contraction of the sphincter ani. Brodie[3] has observed a woman, in whom the spasm after a year's duration suddenly ceased, upon which insanity occurred, which also lasted one year. With the cure of the latter the spasm returned. The case of the child above alluded to proves that dentition may prove an exciting cause. Lukewarm baths and purgatives produced no effect; but after the cramp had lasted three months, the child cut its first incisor, it then at once remitted, and ceased entirely after a week's time.

The treatment hitherto adopted for this spasm has been unsuccessful; it would therefore be useless to enumerate all the remedies to which recourse has been had without any definite indication. In one case, Bright obtained a permanent cure by the exhibition of large doses of carbonate of iron (two and a half drachms) and by applying a moxa to the nape of the neck. In the case of a girl of 14 years of age, observed by myself, increasing doses of the sulphate of zinc were followed by a satisfactory result. In another inveterate case, electricity, in the shape of sparks drawn from the nape of the neck, produced a good effect.[4] Even the division of the

[1] Bright's Reports, &c., vol. ii, p. 500.

[2] Beiträge zur Operativen Orthopædik, p. 146.

[3] Lectures illustrative of certain Local Nervous Affections, p. 8.

[4] Guy's Hospital Reports, vol. vi, p. 94.

branches of the accessory, as attempted by Dr. Bujalsky, of St. Petersburg, and reported by Stromeyer,[1] was not followed by any permanent results; nor is it an operation that deserves to be repeated, as, independent of the great difficulty of the operation in the living subject, besides the accessory nerve, branches of the cervical nerves are distributed to the sterno-cleido-mastoid, the affection of which would be liable to predominate. A happier result is likely to attend the division of the affected muscle, which has been executed by Stromeyer and Amussat with permanent results, although even here at times obstacles present themselves to the recovery. Thus, I have met with one patient, who was affected with this spasm in an intense degree, and in whom the repeated division of the sterno-cleido-mastoid by Professor Dieffenbach was utterly ineffectual.

The permanent contraction of the sterno-cleido-mastoid and the trapezius (caput obstipum spasticum) is generally a symptom of inflammatory affections of the cervical vertebræ, and more frequently attacks the right than the left side. The tenderness of the cervical vertebræ to the touch, and the violent pain brought on by attempts to place the head in the straight position, are pathognomonic of this state of things. As the disorganising process advances the tonic spasm ceases, passes into paralysis, and the muscles of the opposite side now acquire the upper hand. If the inflammatory affection of the vertebræ is attended to in good time, and overcome by the local abstraction of blood, issues, and the administration of alterative medicines, the torticollis will disappear spontaneously.[2]

[1] Loc. cit., p. 140.

[2] See Stromeyer; loc. cit., pp. 147—150.

CHAPTER VIII.

SPASM IN THE RANGE OF THE MOTOR NERVES OF THE UPPER EXTREMITIES.

Spasmodic movements or positions of the upper extremities are rarely brought on by irritation of the brachial plexus; they are generally the result of affections of the central organs. A peculiar form of local spasm in these parts has, however, recently been made known under the name of the Writer's Cramp. In this affection every attempt to write instantly calls forth spasmodic movements in the thumb, the index and middle finger, so that the pen starts up and down on the paper, and instead of a legible handwriting a mere scrawl results. Canstatt[1] distinguishes between a writer's cramp of the flexors and extensors. The more the patient persists in his attempt, the more the difficulty of using his pen increases, and to the visible and sensible contractions of the muscles of the thumb, contractions of the forearm, and even of the upper arm are often superadded, as I have myself lately had occasion to observe. Abnormal sensations, especially a sense of weight, and constriction of the hand, or of pain extending from the upper arm to the back, are occasionally present. It is diagnostic of these attacks, that they are instantly arrested when the individual ceases writing; and that the hand is capable of every other combination of movements and exertions. Even if the complaint is persistent for a length of time, no other disturbances in the nervous functions of the arm present themselves. Hitherto the writer's cramp has almost exclusively been met with in the male sex; I have only heard of a single instance occurring in a female. The early period of life appears to be exempt. An occupation entailing much writing predisposes to the affection. No other etiological relations of the writer's cramp, to which Brück[2] has been the first to draw attention, have been ascertained.

[1] Die Specielle Pathologie und Therapie, vol. iii, p. 313.

[2] Casper; Kritisches Repertorium, 1831, vol. xxx, II, 1.

The act of writing is a result of an effort of intelligence and motility, and may be variously impaired by a disturbance of either. In dementia, acquired idiotcy, the patient is not able to write his own name; the first letters are legible, but then follow irregular scrawls; the unconnected appearance of the writing corresponds to the state of the thoughts, which are equally irregular. On the other hand the function of motility is at fault, being either diminished or exalted. Paralysis of the upper extremity, dependent upon a cerebral or spinal affection, frequently commences with impaired power of conduction in the motor nerves of the fingers, and consequent difficulty of writing: a man was under my care whose disease lay in the cerebellum, and made its debut with an impediment in writing. This paralytic incapacity was not, however, confined to writing, but interfered with every other kind of manual occupation, as is the case in tremor manus; nor is there in these paralytic affections the sensible contraction of the individual muscles of the fingers, and the diagnosis is further facilitated by the presence of other symptoms. The latter is particularly the case when a centric affection commences with spasmodic contraction of the muscles. Thus, some time back a man of 43 years of age presented himself among the outpatients of the hospital, who, in consequence of a severe cold, had suffered from violent pains in the right shoulder joint, extending down to the hand, where they caused a sensation as if the tendons were too short. Frequently on attempting to write, cut his pen, or seize small objects, for instance, a needle, contractions of the fingers ensued and prevented his carrying out his intentions. The pains in the shoulder increased with changes in the weather. They were relieved by anti-rheumatic remedies, but after a few months a sense of numbness in the right ear, going to sleep and dragging of the left leg, and stammering supervened, so that a disease of the right hemisphere of the brain was assumed to exist. I have met with another similar case, in which, however, the course of the disease proved that it had a peripheral origin. The patient, a man of 53 years, had for three years suffered from violent rheumatism in the right shoulder joint. It gradually disappeared, and left a marked weakness of the right hand, which particularly interfered with the flexion of the fingers; at the same time there was a

dull pricking sensation at the tip of the thumb and the first and second finger. Whenever the patient made an attempt at writing, the pricking extended up the forearm, and combined itself with jerking contractions of the hand and forearm muscles, which prevented the continuance of writing. Considerable sedimentation in the urine, and copious acid perspirations proved the continuance of the rheumatic diasthesis. Frictions of the arm with the oleum terebinthinæ æthereum, and a course of twenty-four Russian baths, with the application of the cold douche to the affected extremity, restored the patient to perfect health.

In the writer's cramp it is characteristic that the movements of the fingers preserve their integrity with regard to every other species of occupation; although we must not overlook a case described by Stromeyer,[1] in which an attempt to play on the pianoforte caused the thumb, with the second phalanx completely flexed, to be immediately drawn under the hand. I may remark that cramps of the fingers in other occupations have not met with the attention they deserve. Some time ago a smith, aged 37, came under my notice, who applied for relief at the hospital, for a rigid contraction of the muscles of the forearm, occurring whenever he took hold of the handle of his hammer, and wanted to fetch a blow; it was accompanied with violent pain, and the tense muscles were said to project like cords under the skin. This cramp had prevented him from attending to his business for the previous six months. All the other movements of the arm were unimpaired, nor did the motor or sensory functions of the arm show any other deviation from the normal standard. A violent concussion of the arm was stated to have given rise to the complaint in the first instance. The most energetic remedies, and at last the continued application of electro-magnetism produced no effect, so that the patient was forced to abandon his trade, and to occupy himself with painting doors and windows, the handling of the brush not causing any inconvenience.

It would appear from the above, that the peculiar position of the fingers in certain manual occupations, itself initiated with ease by an effort of the mind, and even maintained for a

[1] Ueber den Schreibekrampf, in—Medicinisches Correspondenzblatt Baierischer Aerzte, 1840, No. 8, p. 117.

while, acts by reflex irritation, and destroys the co-ordination of the nerves and the association of the muscles, by a spasm. In the first edition of this book, I assumed that other influences, such as the quality of the paper or of the pen, might operate in the production of the writer's cramp; the following observation proves that this is not the case. A boy of 8 years had for six months been affected with a convulsive extension of the fingers of the right hand, rendering the hand so stiff that it could not be bent. The paroxysms were accompanied by a pricking sensation extending upwards to the elbow, and they recurred from five to eight times daily, and lasted several minutes each time. The left arm was subsequently affected in the same manner, and after this epilepsy was fully developed, the approach of which affection had been predicted the first time the boy was presented to the students, the spasm being viewed as an aura. Among the exciting causes none brought on the paroxysms so frequently as an attempt at writing; a rigid contraction of the muscles of the thumb at once ensued, by which the limb was crossed over the hollow of the hand. The contact of the pen had no influence, for the same phenomenon occurred when the boy, without taking hold of a pen, placed his fingers in the position necessary for writing, whether he rested his hand on the paper or figured the letters in the air.

In speaking of this obscure affection we may also allude to the fact that some persons are liable to feel slight shocks, resembling electric discharges, in their fingers while they are writing. Professor Müller[1] states that at a time when he was suffering under nervous irritation, he frequently presented this symptom whenever he had over-exerted his hand and fingers.

The *treatment* hitherto pursued, both local and general, has been invariably ineffectual, so that the patients generally ceased from all attempts at cure, and remained satisfied with mechanical contrivances, the object of which was more or less to cause a pressure upon the skin and the subjacent muscles. Stromeyer[2] also applied the principle of division of the muscles to the cure of the writer's cramp, and in one case a brilliant result justified the antispasmodic reputation of tenotomy. As early as the fourteenth day after the subcutaneous division of the

[1] Elements of Physiology, Dr. Baly's Translation, vol. i, p. 640.

[2] Loc. cit., p. 118.

tendon of the flexor longus pollicis, the patient was perfectly able to resume his pianoforte playing, and to write. On the other hand it is to be observed that the operation was perfectly ineffectual in several patients upon whom Dieffenbach operated.

After amputation or fracture the injured limb (an arm or a leg) is occasionally attacked with spasms, which are either caused by direct injury of the motor nerve, or by reflex action. Thus Dr. Babington[1] relates the case of a woman, aged 20, whose right arm was amputated on account of scrofulous disorganisation of the elbow-joint. Three months later she complained of the stump starting up in her sleep; it soon began to move constantly to and fro, in alternate abduction and adduction. While the patient slept, the movement was limited to a mere tremor. The treatment was ineffectual.

[1] Guy's Hospital Reports, vol. vi, p. 423.

CHAPTER IX.

SPASM IN THE RANGE OF THE MOTOR NERVES OF THE INFERIOR EXTREMITIES.

The seat and cause of the affection induce various modifications in the phenomena accompanying it.

Among the muscular nerves of the thigh, the branches of the first and second lumbar nerves, which are distributed to the flexors, the psoas and iliacus, are the more frequent seat of the spasm, and cause the spasmodic contraction of the hip, the diagnosis of which disease has been determined by Stromeyer's investigation. The extremity is bent at the hip-joint, and is incapable of being extended. Attempts at extension excite violent pains in the knee. The tendons of the psoas and iliacus, and the muscles themselves, project in dense ridges; touching them increases the pain in the knee. The hip is drawn up by the action of the quadratus lumborum and the abdominal muscles, so as to induce an apparent shortening of the extremity, from the tip of the affected foot only touching the ground in walking.

Spasm rarely attacks the muscles that move the leg, and cause extension or flexion of the knee; but it is frequently seated in those filaments of the sciatic nerve which supply the triceps extensor cruris, and sometimes also in those of the tibialis muscle, with or without an alteration in the form of the foot. In the former case, pes equinus or varus is produced, the spasmodic character of which is most distinctly manifested when the club-foot occurs periodically under certain conditions. A few cases of this kind are contained in the works of Stromeyer and Dieffenbach, and possess too great importance in reference to pathology not to be detailed here. A man, aged 30, had been affected with club-foot shortly after he first learned to walk, without any appreciable cause; in walking he only rested upon the outer edge; but when he sat, the foot could be almost reduced to the normal position, even when the knee was

stretched, but still more easily when it was bent. As soon as he attempted to step, the sole of the foot was turned inwards, and violent pain ensued. In a child of a year and a half, the right foot in walking took the shape of pes equinus, while in sitting and lying no deformity whatever could be discovered. The pointing of the foot showed itself in the first attempts at walking.[1] A robust youth of 15, one day mounted upon a table to set the clock; on jumping off backwards on to the ground, the toes came first in contact with the floor, and he at once experienced a sharp pain in the heel, so that he could no longer use the foot. Frictions with oil relieved the pain after a few days, but on again attempting to walk, only the toes touched the ground; the heel was drawn up two inches, and even the entire weight of the body was insufficient to press down the heel. While sitting, the young man could place his foot in any position he chose; and this, as appeared at first, only because in bending the knee joint, the calf was relaxed and elongated. But on close examination, a different rationale was discovered. When the patient lay on his back, so that the knee joint and the muscles of the calf were relaxed, he was able to effect every movement with the metatarsal joint; to extend, adduct or abduct the foot. It is consequently a matter of physiological interest to observe, that when the gastrocnemii were inactive, they could be extended by the flexors; and that, in the erect posture, the gastrocnemii, notwithstanding the weight of the body resting upon the foot, were shortened as much as two inches. Mr. von J., aged 22, a student of philosophy, robust and in florid health, was attacked in his early youth with a debility of the lower extremities, rendering locomotion difficult. Strengthening baths and spirituous lotions were the remedies employed at the time. The examination of the extremities showed no difference either as to form or nutrition. In the sitting posture both feet were perfectly well formed, and the young man was able to make any movement with facility; but if he rose and walked, his gait was insecure, tottering and waddling, resembling the movements of a person upon polished ice with smooth boots. His walk became more irregular when he took off his boots and stockings, and walked barefoot through the room; he was then

[1] Stromeyer; loc. cit., pp. 83 and 95.

[2] Dieffenbach; Ueber die Durchschneidung der Sehnen und Muskeln, p. 225.

often obliged to support himself, to prevent his falling. If he placed his feet on the ground, their form was normal; but, as soon as he rose from his chair, and the feet had to bear the weight of the body, they instantly assumed the shape of splay feet, the arch of the sole disappeared, the toes contracted, and were raised with the front of the foot, so that the dorsum of the foot presented a concavity.[1]

Spasm of the muscles of the calf occurs more frequently without alteration of the shape of the foot; it results from irritation of the sciatic nerve, and is accompanied by intense pain.

Peripheral, as well as reflex, irritation may induce the complaint. Morbid processes of the vertebræ, especially of the lumbar region, are not unfrequent causes of the former class, and they give rise to contraction of the hip-joint, in the same way as disease of the cervical vertebræ originates the caput obstipum. The abdominal organs may also implicate the lumbar and sacral plexuses directly, an instance of which is afforded by the pregnant uterus. Their influence is, however, more frequently one of a reflex character; thus spasm of the muscles of the calves is associated with dysentery, and the coincident occurrence of spasm in the extensors of the fingers is a further evidence of its being due to reflex irritation. Intestinal irritants of a different kind may operate in an analogous manner. We must not overlook the irritation proceeding from the womb. The hysterical affections of the joints described by Brodie[2] may probably be referred to this source. Thus Andral relates the case of a girl, of 19 years, whose menstrual period was suddenly arrested by a fright, and was afterwards affected regularly, at the time at which the menses should have appeared, with spasmodic contraction of the inferior extremities. The leg was flexed to such a degree that the heels touched the nates. During the intervals her health was undisturbed, and on the restoration of her courses the convulsions ceased. The cases of periodic club-foot which have been related, direct the attention to the skin. This generally, and especially the cutaneous coverings of the sole, must be looked upon as a great source of reflex irritation:

[1] Dieffenbach; loc. cit., p. 240.

[2] See pp. 64 and 74.

the mere contact of the sole with the ground, particularly when bared, is found to excite an attack of spasm. Brodie[1] has often observed that in the hysterical affections of the joints, to which he has drawn attention, a gentle touch of the cutaneous coverings induced convulsive movements of the leg, which at times became so violent, as to throw up the thigh, and occasionally to resemble chorea. Twitchings and contractions of the muscles of the lower extremities are occasionally met with as symptoms of centric disease of the spinal cord, though not so frequently as paralysis.

Our treatment is often crowned with brilliant results if we attend to the course. Such is the case in spasmodic contraction of the hip-joint, dependent upon a disease of the osseous tissue of the lumbar vertebræ. The accurate examination of the spine will prevent this error, and direct the application of derivatives (issues and inunction, with tartar emetic) to the proper locality. Removing the intestinal and uterine irritation affords permanent relief to the cramps of the calves. In spasmodic clubfoot the treatment formerly adopted was of no avail. In the cases above quoted cures were obtained by tenotomy and myotomy.

Among the spasmodic affections of the extremities there is one which has attracted some attention in modern times, and, from attacking both hands and feet, has been termed carpopedal convulsion. It is met with mainly during the first three years of life. The fingers are bent across the hollow of the hand, with the thumb underneath them; the latter is rarely affected alone; at times the entire hand is flexed inwards. An attempt at extension creates pain. In some cases a trifling tumefaction and reddening of the hand and the fingers has been observed. The feet suffer in a like manner, but only in company with the fingers, and not by themselves. The toes are doubled inwards, the big toe being generally abducted and the foot rigidly extended. The spasm occurs periodically, or is persistent for days and weeks. There are no other symptoms of an affection of the brain or spinal cord, a circumstance which has induced some modern French writers to look upon it as an idiopathic contraction of the muscles.

This spasm generally accompanies other and especially in-

[1] Lectures illustrative of certain Local Affections, p. 43.

testinal affections, from which it originates by reflex irritation. Thus it also occurs during dentition, by itself or associated with spasm of the glottis.

The *prognosis* is favorable as to the issues of those spasmodic affections which are unconnected with cerebral disease; those of cerebral origin are generally unilateral. The *treatment* must differ accordingly; the fundamental disease must be attended to, and only when this has ceased, and the spasm still continues, anti-spasmodics, asafœtida, baths containing an infusion of valerian, should be employed. Whoever in such cases has recourse to abstracting blood, blisters, and debilitating remedies, must be held responsible for the injury which will ensue.

CHAPTER X.

SPASM IN THE RANGE OF THE NERVES CONTROLLING THE MOVEMENTS OF RESPIRATION AND VOCALISATION.

Experimental results. — The theory adopted by Arnold, Bischof, Valentin, and Longet, that the vagus is a sensory nerve, deriving its motor powers, as manifested in the nerves of the pharynx and larynx, only from the filaments of the accessory which unite with it, has been shaken by the recent observations of Volkmann. Irritation applied directly to the roots of the vagus in recently killed animals gave rise to movements of the pharynx, the soft palate, and the muscles of the larynx. It was not so frequently accompanied by alterations in the dimensions of the rima glottidis as by a twitching in the prominent parts of the arytenoid cartilages. A curling of the muscles was observed in the crico-arytenoideus posticus and lateralis. After dividing the vagus below the superior laryngeal nerve, irritation of the latter did not produce the slightest effect upon the movement of the rima glottidis, but by galvanising the peripheral portion of the divided nerve the rima was dilated, and the chordæ vocales were occasionally rendered tense. After removing the cerebrum and cerebellum in two young dogs, Volkmann exposed the rima glottidis, and found that it opened and closed in every act of respiration. The superior laryngeal nerves were then divided in one, but no change in the movements of the glottis resulted. In the other Volkmann divided the vagus on both sides of the neck, and thus destroyed the effect of the recurrent branch; the chordæ vocales instantly closed, and did not re-open.[1] These experiments disprove the assumption of Magendie that the muscles that close the glottis, the arytenoideus transversus et obliquus, are supplied by the superior laryngeal nerve, which Rudolphi and Schlemm had previously done anatomically. Longet galvanised the nerve filaments of the arytenoid muscle in the

[1] Müller's Archiv, 1840, p. 494.

larynx of a recently killed horse, and observed that the muscle at once contracted, and the glottis was narrowed by the approximation of the arytenoid cartilages.

The spasmodic movements of respiration occur either in isolated acts, or associated in groups. The spasm of the glottis and bronchial spasm are the representatives of the former class.

SPASMUS GLOTTIDIS.

Asthma laryngeum.

Contraction of the muscles closing the rima glottidis causes an impediment to, or entirely arrests inspiration. There is no disease or injury of the larynx with which this affection may not be associated. As an idiopathic affection, which mainly occurs in early infancy, though not unknown to older authors, it has recently been described under various denominations, as asthma acutum Millari, asthma thymicum, spasmodic croup, laryngismus stridulus; we, however, prefer the name which heads this paragraph, as the most simple. Spasm of the glottis occurs in paroxysms of varying intensity, according as the glottis is partially or entirely closed. The milder attacks are characterised by a short attack of dyspnœa, difficult and often sonorous inspiration, as in apnœa, accompanied by restlessness and an anxious expression of the face; such attacks are at first often unnoticed, as the health of the child does not appear affected in the intervals. A trifling mucous rattle in the larynx sometimes precedes. In the more violent paroxysms the apnœa approaches to suffocation, and the respiration is interrupted for seconds, and even for one and two minutes. The eyes are wide open and staring, the face becomes livid or cadaverous, the alæ nasi and the muscles of the neck act violently, the arms are stretched out and rigid, asphyxia appears unavoidable when at last the air penetrates in jerks and with a sonorous tone, and the paroxysm closes with a fit of crying and sobbing. During its continuance the spasmodic contractions of the head and feet often occur, of which we have spoken at page 328; in a few instances they continue during the intermissions, or they alternate with the spasm of the glottis. The

same applies to the general convulsions, which occasionally precede the outbreak of this affection. This was the case in a girl of fifteen months, who, in the month of February in 1846, was under my care as an out-patient of the hospital; some weeks previously it had passed through several attacks of eclampsia, which had left contractions of the upper and lower extremities. The forearm was bent upon the upper arm, and the leg upon the thigh, so that forcible extension was impossible; consciousness remained unimpaired. The contractions lasted four days, and then disappeared spontaneously. They were followed by attacks of spasm of the glottis, alternating with eclampsia. Small doses of calomel with rhubarb, baths, and enemata of asafœtida, produced a temporary alleviation of the symptoms. In March and June the same phenomena recurred with increased violence; then ceased until December, when the spasm and the eclampsia again alternated. The circumstance that an eruption of impetigo capitis during the summer had diminished the attacks, and the spontaneous disappearance of the cutaneous affections had been accompanied by a return of the convulsions, was used as a therapeutic indication, and the Unguent. Antimonii Tartarisati rubbed in partially in the hairy scalp. Since this time the spasms have not returned, and the child has grown up strong and healthy.

The attacks of spasm of the glottis occur more frequently by night, and on awaking from sleep, than by day. Sucking, deglutition, straining in defecation, a sudden movement, often produce them instantaneously. At times the reflex irritability is generally exalted; a slight touch or noise causing a start and the fit. Of the accompanying symptoms those of derangement of the digestive organs are the most frequent, such as constipation, an abnormal greyish yellow colour of the fæces, resembling putty, rarely diarrhœa, and accumulation of gases in the intestines.

The duration of the disease extends over several weeks and months, with intermissions of shorter or longer duration. It is only in very rare cases that recovery or death takes place during the first days of the illness. Among the predisposing causes, the first period of dentition exerts the greater influence. There are instances on record of its affecting children during the first few weeks of life; thus one of my own children was

attacked with violent spasm of the glottis on the second day after birth, but it only occurred in a single paroxysm, and did not return. Others have observed it in the third and fourth year, but these are exceptions, the chief proclivity being manifested from the sixth to the fourteenth month. There can be no doubt of the existence of an hereditary predisposition; in many families several, and even all, the children, though they may have been differently brought up, both as to residence and food, are attacked with spasm of the glottis. In one family I attended two children who laboured under this complaint, (one of whom died,) after three other children of the same family had fallen victims to it. Reid[1] mentions one family of thirteen children, only one of whom escaped, and four died. The soil and the atmosphere exert some influence upon the origin of the complaint; thus it occurs more frequently in towns than in the country, and some towns, as London and Hamburg, are remarkable for the greater frequency of its occurrence than others, *e. g.*, Paris. Children brought up by hand appear to suffer more frequently than children who have been nursed at the breast. Weaning appears to favour the development and continuation of the disease. It may terminate in three ways: 1, in recovery, which is generally gradual; 2, in immediate death by asphyxia, the most violent efforts to breathe are fruitless, the head is bent backwards, the trunk is in a tetanic condition, and suddenly the child collapses, and has ceased to exist; 3, indirectly, in death by general convulsions and sopor.

The post-mortem examinations coincide as to the integrity of the larynx and trachea; as well as with regard to the changes induced by the asphyxia, consisting in congestion of the lungs, in the right side of the heart, and in the brain.

The paroxysmal character of the affection, and the calmness of the respiration during the fore intervals, suffice to distinguish it from croup and diphtheritic disease of the larynx. In the former there is no fever, and the voice is unaltered. Cough, the constant accompaniment of croup, is not observed during the attacks of spasm of the glottis, and is an accidental occurrence during the intermissions. Cramp of the toes and fingers are not seen as sequelæ of croup. In this disease the

[1] James Reid, on Infantile Laryngismus; London, 1849, p. 19.

intensity and danger increase with every hour; in spasm of the glottis the climax is not attained for several weeks. It is also important to determine the diagnostic distinctions between spasm of the glottis and paralysis of the recurrent nerve. In the latter we also find attacks of dyspnœa increased to imminent suffocation, there is sonorous inspiration, but generally only with bodily exertion, when greater demands are made upon the organs of respiration, and in that case accompanied by noisy, hissing respiration, or a whispering hoarse voice, short cough, mucous rhonchi, insensibility of the trachea, and other symptoms, which will be found detailed in the second volume, in the chapter on Paralysis of the Vagus. The causes of this variety of paralysis, as, for instance, swelling and induration of the bronchial and cervical glands, or tumefaction of the thymus, are absent in spasm of the glottis; nor does dentition bear any definite relation to the former.

Hugh Ley committed an error in maintaining that the phenomena of spasm of the glottis depended upon a paralysis of the vagus. It was faulty physiology to assert that while the muscles, that open and dilate the rima glottidis, are deprived of their motor impulse, the antagonistic occluding muscles which are supplied by the superior laryngeal, overbalance them. The view according to which spasm of the glottis is brought on by a centric affection of the brain, is equally baseless. It gained some ground from the frequent association or succession of the spasms; but the integrity of the intellect in and out of the attacks, and the entire absence of cerebral symptoms in the course of the disease when uncomplicated, ought not to have been overlooked. The spasmodic respiratory movements, equally with the normal movements, are dependent upon the reflex action of individual nerves, or of whole groups of motor tracts; the exciting stimulus may reside in the vicinity of, or at a distance from, the motor nerve. With regard to the physiological argument, it is immaterial whether the contraction of the transverse and oblique arytenoid muscle is induced by a drop of water penetrating into the glottis, or by the irritation proceeding from a dental twig of the fifth pair, for in either case the centrifugal action is caused by a centripetal excitant; for the pathologist, however, a knowledge of the seat of the centripetal irritation is important, because, independently

of the therapeutic interest that attaches to it, he will be enabled to estimate those diseases correctly with which spasm of the glottis is found to associate itself.

Life is endangered by suffocation or the supervention of eclampsia. Even if the attacks are not very intense, it is necessary to be careful; for the rima of infants, which is so small and narrow, often closes unexpectedly and suddenly. Richeraud was the first to determine that the larynx and glottis, which, in early life, are very small, suddenly increase at the period of puberty, in the male sex in the proportion of 5 : 10, in females of 5 : 7. Schlemm[1] has confirmed this observation, and has added a few details; thus he found the rima glottidis of a child of 12 years, one and a half to two lines longer than that of a child of 3 years, and in the latter it was three quarters of a line longer than in a child of nine months. This relation accounts for the greater danger of spasm of the glottis, and of laryngitis in infancy, as well as for the greater mortality in animals after division of the recurrent branch, the younger the animals are. Reid[2] has observed that children brought up by hand run greater risks than children who have been nursed. The risk of a relapse continues during the whole period of dentition.

The treatment of spasm of the glottis during the attack must be directed against the asphyxia; cold water should be thrown over the head, neck and face, cold air be allowed to play upon the face,—Reid recommends blowing at the child,—the præcordia be warmed with hot napkins; the feet may be wrapped in flannel steeped in a weak infusion of mustard, and enemata with an addition of asafœtida be exhibited. It has been proposed to give chloroform, but its effect upon the brain under such circumstances would probably render it unsafe. Nobody would attempt tracheotomy at the commencement of the attack, and if postponed too long no benefit can be expected from it. During the free intervals we must direct our attention to the cause. The first thing to attend to is the atmosphere and the diet. The advantage of country over town air, especially to persons residing in confined localities and ill-ventilated rooms, is undeniable. If the circumstances of the patient

[1] Rudolphi; Grundriss der Physiologie, vol. ii, p. 344.

[2] Loc. cit., p. 101.

preclude the possibility of a change, the child should in mild weather be carried as much as possible into the open air. The infant should not be weaned during the continuance of the disease. It is important to avoid over-repletion, which is very apt to occur in hand-feeding; and when it has occurred it should be removed by emetics. The intestinal canal demands special attention; emetics, which are too apt to suggest themselves, only afford temporary relief. The best remedy for the constipation ordinarily accompanying the disease is castor oil, and if the evacuations show a deficiency of bile pigment, calomel should be exhibited. We should now have recourse to anti-spasmodic remedies, among which I give the preference to asafœtida; in four cases I have found the most beneficial results attending the administration to infants under a year, of equal parts of the aqua antihysterica fœtida and syrup; I gave it in doses of a teaspoonful four to six times a day.[1] I have found less benefit in the use of musk and ammonia, the latter given in the form of liquor cornu cervi succinatus.[2] Scarification of the gums, in England considered a panacea, has not met with much countenance in Germany, as the excitement produced by the operation in the child outweighs the possible advantages of the incisions. If apoplectic symptoms supervene, the local abstraction of blood is indicated, though much care should be observed in its administration, as it is apt to induce strangulation and death. When eclampsia supervenes, cold affusions of the head and back may be had recourse to; the not unfrequent presence of anæmia in children affected with spasms of the glottis, demands the continued exhibition of iron, which may advantageously be combined with small doses of rhubarb.

[1] [Aqua antihysterica fœtida sive Pragensis, a water distilled from asafœtida, galbanum, castoreum, myrrh, valerian, angelica; commonly given in hysterical affections, in doses of one drachm, every two hours.—Ed.]

[2] [The Liquor Cornu Cervi Succinatus, a succinate of ammonia, is prepared by dissolving an ounce and a half of succinic acid in a pint of water, and saturating it with the ammonium carbonicum pyro-oleosum, itself a sublimate of Carbonate of Ammonia with the Oleum animale æthereum.—Ed.]

CHAPTER XI.

SPASMUS BRONCHIALIS.

ASTHMA BRONCHIALE.

Notwithstanding Reisseissen's discovery of the presence of muscular fibres in the finest bronchi, where even the cartilaginous tissue has ceased to be discoverable, the capability of the bronchial ramifications to contract on the application of stimuli has been denied.[1] The experiments of Dr. Williams[2] have recently confirmed the existence of this function. Mechanical, chemical, or electric irritation gives rise to contraction which does not take place suddenly, as in a voluntary muscle, but is effected gradually, as in the intestines; it is exhausted by continued irritation, and is restored, even after the lapse of hours, if the lung be allowed rest, and even if it be removed from the body. It is diminished or destroyed by stramonium, belladonna, conium, strychnine, and morphia. Irritation of the vagus produces but a trifling effect; conducting the electric current through the pulmonary nerves produces much less powerful contractions than when it is conducted by the trachea. Longet[3] has observed that the application of mechanical or galvanic stimuli to the pulmonary branches of the vagus, gives rise to contractions in the bronchi of horses and oxen. Volkmann never succeeded in obtaining this result, though, in the following experiment, the motor influence of the vagus upon the lungs was directly manifested. A tube was fixed in the trachea of a decapitated animal, which was pointed externally, and was drawn out into a very fine orifice. If a candle was placed before this opening and the vagus galvanised, each irritation of the nerve gave rise to an instantaneous inflection of the flame, and on one occasion it was actually

[1] Müller; Elements of Physiol., Dr. Baly's translation, vol. i, p. 346.

[2] Pathology and Diagnosis of the Diseases of the Chest, 4th ed.; London, 1840, pp. 320-331.

[3] Longet; Anatomie et Physiologie du Système Nerveux, 1842, vol. ii, p. 289.

extinguished. The experiment also succeeds after the thorax has been opened, but the movements of the flame in that case are much weaker, because the lungs are collapsed, and contain little air. It deserves to be especially remarked that these movements occur in jerks. The lungs would scarcely be capable of executing such rapid movements if they were not required in daily life, and they cannot be supposed to serve any other purpose than that of rhythmical respiration.[1]

The progress made in the knowledge of diseases of the lungs and the heart, has expelled the asthma convulsivum of the older nosologists from our present list of diseases, and in its place we assume organic alterations in the bronchial mucous membrane and in the heart. The distinction to be made between mere dyspnœa, which is nothing but an expression of the abnormal relation existing between the blood and the air in the lungs, and asthmatic attacks, has not been properly attended to, and this has only added to the confusion. Laennec, to whom we owe so much that is valuable, was the first to avail himself of his great discovery auscultation, in order to establish the contraction and dilatation of the minute bronchial ramifications by the disappearance and return of ordinary and puerile respiration in states in which every suspicion of a mechanical obstruction was avoided; it is in fact by auscultation that spasm of the bronchi receives its strongest confirmation.

The paroxysms, which are separated by free intervals, occur most frequently at night. They are either sudden or they are announced by oppression and distension of the epigastrium. The patient has a desire to fetch a deep breath, but he feels that the air does not pass beyond a certain point of his thorax. At this point hissing, piping, or purring râles are heard, both during expiration and inspiration, often even at a distance, and so as to be audible to the patient himself. The dyspnœa is augmented; the respiratory muscles, and especially the auxiliary groups, act violently; the alæ nasi are distended; the outlines of the sterno-cleidomastoids become prominent; the head is drawn back, and the patient rests his arms against a firm object in vain, to distend his thorax. The vesicular murmur ceases, and is here and there replaced by a sibilant

[1] See the article, Nervenphysiologie, in Wagner's Handbuch der Nervenphysiologie, 10 Lief., p. 586.

râle, which appears and disappears suddenly, whilst the inspiratory murmur of the larynx and trachea continues not only undiminished, but even consonates more strongly. Anxiety is depicted in the countenance of the sufferer; the eyes are opened wide; a cold sweat covers the brow; the face becomes pallid; the heart beats violently, irregularly, and unequally, while the radial pulse is small and weak, and the temperature of the hands and cheeks is reduced. An attack of this description continues for a quarter of an hour, and may be prolonged for several hours, with short remissions. It then suddenly ceases; the air rushes violently into the bronchi and pulmonary vesicles, into which it had previously been precluded from entering, and a puerile murmur is produced; or else the remission takes place gradually, accompanied by eructations and yawning, or less frequently with cough, and an increase of secretion from the bronchial mucous membrane, with moist rhonchi, which persists for a time.

Such attacks occasionally recur with a regular type for a time, and even for weeks successively. They then cease, and a long pause follows, in which the patient enjoys perfect health.[1] The middle period of life, hæmorrhoids, arthritis, and albuminuria, predispose to the affection. We find that depletion of the stomach and intestines, and especially flatulence, as well as mental emotions and psychical affections, generally act as exciting causes. Laennec relates the case of a robust man of 82, who from his youth upwards had been subject to asthmatic affections, which only occurred rarely, but invariably supervened when the door of his bedroom was accidentally closed, or the night lamp was estinguished. It is commonly the case that the violence of asthmatic attacks is increased by darkness. Atmospheric conditions frequently exert an influence upon asthmatic patients. Some are affected by electric tension; others by attenuated, and others by a thick air. Cullen was already acquainted with the power which ipecacuanha possesses of inducing asthmatic paroxysms. An apothecary of this town has lately related to me, that whenever ipecacuanha is powdered in his yard, a bookseller's wife, who resides in the third floor of the house, is at once attacked with violent asthma, a fact which a medical man, in whose opinion I can

[1] Bergson; The Spasmodic Asthma of Adults, 1850, p. 40.

place reliance, and who was called in during a paroxysm, has confirmed.

The *prognosis* of the affection depends upon whether the bronchial spasm occurs in the isolated or complicated form. A fatal issue by asphyxia is not to be feared, as in spasm of the glottis; let the symptoms be ever so imminent, there is scarcely ever any danger of suffocation in simple bronchial spasm. The disease is very tenacious, and extends over a series of years. Floyer, whose work on asthma (London, 1698,) made a great noise at the time it appeared, could not remember the time when he was first attacked, and he attained his 80th year without suffering any interruption in his career.[1] Nevertheless, when the paroxysms are very frequent, the effect necessarily exerted upon the constitution of the blood should not be overlooked.

In the *treatment* of the fit itself, opium occupies the first rank. The patient who has once tried its efficacy is not likely to lay it aside again. Still it is not well to be timid in the choice of the dose; the effect is apt to fail if less than half a grain of the substance, or a corresponding number of minims of the tincture, is exhibited, and the mere teasing effects, as I would call them, are not so injurious in any drug as in this one. I have often obtained much benefit by following the late Dr. Formey's suggestions, and ordering inhalations of sulphuric ether, by holding a cup containing a teaspoonful of the remedy before the mouth. It may be also used in those peculiarly harassing asthmatic attacks which accompany stenosis of the valves, or dilatation of the heart.[2] I possess no observations on the value of chloroform. I have also found irritation of the gastric distribution of the vagus of use, by the exhibition of ipecacuanha in large or small doses. The influence of cold, in the shape of ice pills or artificial ice, often affords instant relief. Marshall Hall gives the greatest praise to hydrocyanic acid, used internally or by inhalation. Percival and Laennec recommend strong coffee. Musk also maintains an ancient reputation. In modern times smoking narcotic leaves made up into a cigar has been recommended; thus I have seen

[1] Bergson; loc. cit., p. 68.

[2] See Hope's excellent description, in his Treatise on the Diseases of the Heart and Great Vessels, 3d ed., p. 401.

relief, though only of a temporary and palliative character, from employing the datura stramonium in this way. Others recommend the lobelia inflata. The radical treatment is promoted by attending to the etiological indications. The digestive organs, the kidneys, and the anæmic condition of the patient, deserve an especial attention. Tympanitic distension of the abdomen, and especially in the colon, is most effectually treated with enemata of cold water and cold sponging. All asthmatic patients are benefited by promoting diuresis. If, in spite of these remedies, the bronchial spasm continues, we may adopt with benefit a plan already recommended by Floyer, and consisting in the application of cold by sponging the body, and wrapping the body in cold wet sheets, this being followed by friction and the use of the river and sea bath. The abstraction of blood, even as a palliative, should be cautiously and sparingly used.

CHAPTER XII.

INSPIRATORY CONVULSIONS.

SINGULTUS.

Hiccup.

It is more frequent to find spasmodic action affecting the respiratory organs in groups, than limited to single nervous tracts; and this may occur idiopathically, or, as is more commonly the case, secondarily, and in connection with other affections. This variety of respiratory spasm is always accompanied by a more or less sonorous explosion, and forms paroxysms with free intervals.

Convulsio singultuosa consists of attacks of sudden jerking inspirations with a peculiar sound, followed by a short expiration. The præcordial region at the time is rendered prominent by the abdominal viscera being protruded. Deglutition and speaking are interrupted.

The intensity and duration of the spasm vary. The former sometimes rises to such a pitch, that the whole trunk vibrates, and a sound is uttered which may be heard at a distance. It is generally of short duration, being commonly limited to weeks or months; but instances occur of its lasting six months and more. Thus in 1849 two Polish jewesses applied for relief in the Policlinique, which was under my superintendence, one of whom, 17 years of age, attributed her illness to an emetic administered in her 11th year. The hiccup occurred at irregular intervals, but without ceasing for a whole day, nor was it arrested by sleep. In the other, a girl of 21 years, the disease had commenced three years previously after a violent fright, caused at the first outbreak of the Cracow revolution. The hiccup, owing to a complication with spasm of the glottis, was louder and more sonorous than in the first case. A spasmodic throwing back of the head during the attack in the latter, and in the former frequent

paroxysms of dyspnœa, with sibilant respiration, during which the hiccup was entirely arrested, showed the participation of other nerves. In both there was tenderness of the epigastrium, and of the spinous processes of the lower cervical and upper dorsal vertebræ, leucorrhœa, with regular menstruation. There was no trichoma. All the remedies previously tried had been ineffectual.

Early and advanced periods of life offer a predisposition. Reflex irritation is the most frequent source of the affection. Older and more recent authors have erroneously assumed the diaphragm and the phrenic nerve to be its main seat. In diaphragmatic pleurisy hiccup is a rare symptom; and it is not produced by irritating the phrenic nerve, as proved by two cases communicated by Bright in the twenty-seventh volume of the Medico-Chirurgical Transactions; the one a case of tetanus, and the other of asthmatic attacks and convulsions of the diaphragm from irritation of the right phrenic nerve by fungous tumours surrounding it; but unaccompanied by hiccup throughout the entire course of the disease. On the other hand we often find that irritation of the internal surface of the pharynx, the stomach, the intestinal canal, and of the liver, are frequent causes of the complaint. Thus we see hiccup accompanying a critical discharge of bile; as it occurs in Asiatic cholera, in which disease I have often noticed that it was a favorable symptom when associated with vomiting of grass-green matters. Pressure on the stomach may also produce it; a patient who was under my care became affected with hiccup whenever I compressed the epigastrium. It not unfrequently results from a premature arrest of dysentery and diarrhœa. In second order after the intestinal canal the uterus is frequently the seat of reflex irritation; and attacks of singultus precede the catamenia, and occur on their suppression. The cause not unfrequently resides in the central nervous organs. Such may be, —injuries of the brain and spinal cord, mental influences, the impression produced from hearing or seeing others affected, though not so frequently as is the case in laughing or yawning, (Sauvages[1] relates an instance,) exhaustion of the central organs by loss of blood, or by discharges, by gangrene, by tedious labours, or a tendency to epilepsy, the hiccup occur-

[1] Nosol. Meth., ed. Daniel, vol. iii, p. 183.

ring as the precursor or sequel of the paroxysms. In a case communicated by Ollivier,[1] in a man who, from his twelfth year, had been subject to epilepsy, each fit commenced with the sensation of a ball rising to his pharynx, accompanied by violent hiccup, which lasted from one to two minutes. Loss of consciousness and anæsthesia ensued, and two or three minutes later the paroxysm terminated. At the post-mortem examination two encysted tubercles, of the size of a nut, were found in the medulla oblongata.

In the treatment we have first to attend to the indicatio causalis. I remember a case of singultus which was under the treatment of my late instructor, Professor Berends, which arose from suppressed menstruation, and resisted the various remedies employed during several days, until three ounces of blood were taken from the foot, when it ceased instantly. When it arises from exhausting discharges, especially in individuals of an advanced age, nothing, as Sydenham[2] already observed, is so efficacious as a full dose of opium. If the cause is unknown we must operate upon the central focus, or try to counteract the reflex irritation. The former is done by establishing counter-irritation in the vicinity of the upper cervical vertebra. Horth[3] strongly recommends the application of a blister round the neck, above the origin of the phrenic nerve. The reflex action must be overcome by mental influences; directing the attention to another subject and fright, have long possessed the reputation among the public of being successful means of cure. We may obtain the same effect by derivation to other motor tracts, for instance by an expiratory effort. Hippocrates[4] observes in his aphorisms: "Sneezing coming on in the case of a person afflicted with hiccup removes the hiccup." Cruveilhier communicates two cases of violent singultus, which lasted eleven days in one and fifteen days in another patient, and had exhausted them to the utmost. He ordered them to be held down upon a chair, had the head bent backwards, and poured water in a stream down their throats

[1] Traité des Maladies de la Moëlle Epinière, 3d ed.; Paris, 1837, p. 778.

[2] Sydenham Society's English edition of Sydenham's Works, vol. i, p. 65.

[3] Remarks on Hiccup, its Causes and Cure, in Edinburgh Medical Journal, April, 1833, p. 305.

[4] Sydenham Society's edition, vol. ii, p. 754.

to the amount of one quart: from time to time, in order to increase the energy of the pharyngeal contractions, he allowed the water to fall upon the nares, which induced cough, threatening suffocation and concussion of all the respiratory muscles. In one the hiccup at once ceased, in the other it returned on the following day, but yielded permanently to a repetition of the process.[1] It has also been recommended to attack the neighbourhood of the diaphragm on the supposition of this muscle playing the main part in hiccup. Dry cupping, frictions with narcotic remedies, the endermic application of morphia, bandages to the thoracic and præcordial parietes, affusion with cold water, have proved efficacious in some obstinate cases. Laennec[2] cured a case of hiccup which had lasted for two days, by advising two magnetic plates to be applied respectively, to the scrobiculus cordis, and to the corresponding point of the vertebral column. Six months after the patient had one day forgotten to apply the plates, and the singultus returned, but ceased on renewed application.

OSCEDO, CHASMUS.

Yawning.

This is a succession of yawns occurring in paroxysms following each other with greater or less rapidity, and accompanied by the well-known phenomena of gaping, flow of saliva, secretion of tears, and hardness of hearing, with dull tinnitus aurium.

This affection, like singultus, must be classed with the inspiratory convulsions; ordinary yawning is an act of inspiration, the expiratory muscles having no part in it, as shown by the observations of fracture of the lower cervical vertebræ. Bell[3] remarks expressly of a patient affected with fracture of the sixth and seventh cervical vertebræ, that he yawned like a man in health, but was unable to execute a strong expiratory movement properly. Besides the combined inspiratory movement in

[1] Révue Médicale, 1824, vol. ii, p. 83.

[2] Traité de l'Auscultation Médiate et des Maladies des Poumons et du Cœur, 4th ed.; Paris, 1837, vol. iii, p. 498.

[3] The Nervous System, &c., 3d ed., p. 400, Case CXLIII.

yawning and oscedo, the action of the facial nerve also comes into consideration, the digastric branch of which causes the contraction of the muscle that draws the jaw down and opens the mouth. The facial is also the nerve of facial expression, and as such the most susceptible of all to the stimulus of mental impressions; we thus have an easy explanation of the imitative contagion, and the facile communication of yawning and oscedo from one person to another.

Of the sources of reflex irritation, those which proceed from the hypogastric plexus, and the gastric branches of the vagus, are the most frequent. The uterus bears a close relation to this convulsive affection; it follows that it is much more frequent in the female than in the male sex, and is peculiarly intense in hysteria. Mere repletion of the stomach with undigested food, shows the dependence of the act of yawning upon irritation of the vagus, which also manifests itself in gastric neuralgia, (see p. 104.) The centric origin of the yawning spasm is shown in cerebral disease, especially in apoplectic states. Sometimes it serves to announce universal convulsions, as in parturition[1] and violent hæmorrhages.

In therapeutics the same maxims apply that hold in singultus.

[1] Roederer de Oscitatione in Enixu; Gœtting. 1759.

CHAPTER XIII.

EXPIRATORY CONVULSIONS.

STERNUTATIO.

The sneezing fit consists of frequent and violent attacks of sneezing, with few intermissions, (ptarmus, sternutatio convulsiva;) it is one of the rarer convulsions, and is dependent upon the nerves of the expiratory muscular apparatus, for the old view of the predominant action of the diaphragm in sneezing is unfounded. The diaphragm is a muscle of inspiration, and is only engaged in the short inspiratory effort that precedes the sneeze; persons who have suffered a fracture of the vertebræ even below the origin of the phrenic nerve, are consequently unable to sneeze and to blow their nose, as in both it is necessary to expel the air through the choanæ.

Ordinary sneezing is a reflex act excited by irritation of the nasal filaments of the fifth pair; when its second branch is affected with anæsthesia, neither tickling the nasal cavity nor the proximity of pungent odours produces any effect. Other filaments of the fifth exert a similar influence. It is probable that in the sneezing produced by the incidence of a bright light upon the eye, the ciliary filaments of the naso-ciliary nerve are more implicated than the optic nerve, for if the latter is pinched or irritated in the living animal no sneezing ensues. De Lens[1] states, that the application of a spirituous liquid to the anterior portion of the palate excites sneezing. I have observed a case of violent sneezing spasm which lasted four years; and in which, after death, the neurilemma of the third branch of the fifth nerve, before its exit from the skull, was found to be morbidly changed, (see p. 255.) Brodie[2] states the case of a woman, aged 37 years, who was attacked once a week with sneezing fits, in which she sneezed at least an hundred times

[1] Dictionnaire des Sciences Médicales, vol. lii, p. 578.

[2] Lectures illustrative of certain Local Nervous Affections, p. 61.

running, and discharged a considerable quantity of watery fluid from the nose; at the same time, she complained of an annoying sense of formication in the face and palate. After a few years the fits became less frequent, and only recurred once a month, but a violent pulsating pain had supervened in the palate, the teeth, and the tongue, without, however, showing any external signs of inflammation or other disease. A young man of 35 years of age, who came under my own notice, had been affected for five years previously without any appreciable cause. Formerly the attacks only occurred every four or five weeks; but for the last six months, scarcely a day had elapsed on which the patient had not sneezed at least fifty times in rapid succession. A creeping sensation in the hard palate almost always preceded, but nothing abnormal was visible here. The attack often commenced if the patient in shaving approached too near the ala nasi. It was commonly accompanied by a copious secretion of tears, and the secretion from the nasal mucous membrane was so much increased, that the patient required two pocket handkerchiefs daily. During sleep there was a perfect intermission. An ocular examination of the parts showed nothing but reddening and excoriation of the lower part of the right nostril, which was fully accounted for by the violent sneezing and the frequent use of the handkerchief. As there was no other indication to be fulfilled, the sesquioxyde of iron was ordered in doses of half a scruple three times a day. In seven days the sneezing had ceased, and the erosion was healed. The carbonate of iron was continued for a few weeks longer, and no relapse occurred. Besides the fifth, there are other foci for the reflex irritation, among which the uterine and intestinal nerves deserve to be mentioned. A lady whom I have been in the habit of attending for some time past, is affected with violent sneezing whenever conception has taken place; it occurs chiefly in the morning hours, and returns in paroxysms during the first months of pregnancy. Brodie was consulted by a young lady of eighteen, who was troubled with attacks of constant sneezing, with a copious discharge of watery fluid from the nose. These alternated with spasmodic cough, or occasionally with globus hystericus and hysterical paroxysms. Her menstruation was irregular and scanty. One of my former hearers informs me, that whenever salacious thoughts suggest

themselves to him, he is obliged to sneeze once or more times. Among intestinal disorders, helminthiasis is most frequently accompanied by sneezing; and in a physiological point of view, affords an interesting parallel with the nasal pruritus accompanying worms. We sometimes meet with spasmodic sneezing in company with hooping-cough. Peter Frank had a patient under his care, who sneezed upwards of an hundred times in every paroxysm, and Joseph Frank[1] relates a similar instance. I have observed an instance in a boy of thirteen, in whom the sneezing fit was substituted for the paroxysm of the cough, the attacks of the former occurring in the same order and frequency as those of the latter.

When the sneezing fit is very intense and of long duration hæmorrhage and convulsions are to be feared; the older authors even speak of its ending fatally. Haller[2] met with a case in which a violent hysterical sneezing fit was followed by an upwards strabismus; and Hildanus[3] with one which produced blindness, which was cured by the application of a seton to the back of the neck. Under such circumstances it becomes a matter of consequence to arrest the attack, and nothing is more adapted to this purpose than emetics. Haller[4] also states that there is a way to stop sneezing by rubbing or pressing the angle of the eye to the nose, by which means we, as it seems, compress the nerve which lies there and passes from the fifth pair to the nostrils.

PERTUSSIS, TUSSIS CONVULSIVA.

It must be manifest to every observer that the expiratory movements predominate in cough; for this reason, the cough becomes very imperfect or is even rendered impossible when the spinal cord has been injured. Thus Bell[5] states of a patient, who was paraplegic in consequence of a fracture of the sixth and seventh cervical vertebra, "when he is asked to cough he pulls up the ribs and expands the chest and lets them fall; he

[1] Praxeos Medicæ Universæ Præcepta, vol. ii, p. 831.

[2] Albrecht, in Ephemer. Curios., Nat., Decas II an. 1687, observ. xii.

[3] Elementa Physiol. Corporis Humani, vol. iii, p. 304.

[4] Centur. I, obs. xxiv.

[5] The Nervous System, &c., p. 400, Case CXLIII.

coughs, but not strongly. It is obviously only by his power of raising the chest and giving elasticity to the ribs and by the weight of the parts falling, that he is enabled to expel the breath. He cannot divide the expiration into two coughs, nor give two impulses to the air; but each time he coughs the elevation of the chest must precede it." Mechanical irritation of the vagus in its course through the neck induces cough in animals. Cruveilhier[1] has observed this to be the case in his own experiments; and I have had occasion, at the Berlin Veterinary school, to see that violent coughing was induced in a horse in whom a portion of the right vagus had been removed, whenever the upper end of the nerve was pinched between the fingers; in doing this I carefully avoided touching the larynx. In Astley Cooper's second operation of applying the ligature to the carotid artery, immediately after completing the dressing, as the patient rose from the chair, so violent an attack of cough ensued that a fatal issue was feared; it was probably induced by the irritation of the adjoining vagus by the ligature and the knotty surface of the artery. Between the sixth and twenty-second day on which the patient died, violent paroxysm of cough followed by dyspnœa returned frequently. At the post-mortem examination the outer surface of the aneurismal sac was found inflamed along the course of the vagus to the base of the skull.[2] Gendrin[3] also relates a case in point: a young man, in consequence of an attack of parotitis, suffered from a large abscess, covering the right side of the neck down to the clavicle; this was opened by Dupuytren, by an incision of an inch and a half in length, and discharged a large quantity of pus, leaving the carotid exposed. From that moment the patient was seized with violent attacks of a dry dyspnoic cough, the exposure of the carotid was inseparably connected with that of the vagus, and the cough was attributable to the irritation of the nerve, which ceased as soon as the healing process withdrew the vagus from atmospheric contact.

In ordinary coughing a contraction of the rima glottidis takes place accompanied by spasmodic expiratory movements of

[1] Dictionn. de Médecine et de Chirurgie Pratiques, vol. xii, p. 44.

[2] Hugh Ley; an Essay on Laryngismus Stridulus, p. 438.

[3] In his Translation of Abercrombie's Work, Des Maladies de l'Encephale et de la Moëlle Epinière, 2d ed., p. 627.

the thoracic and abdominal muscles; in each expiratory movement the rima opens a little, and a loud sound is produced.[1] In spasmodic cough spasm of the glottis forms a constituent of the affection and has given rise to the vernacular name of the disease—hooping-cough.

A sense of titillation in the course of the trachea or at the pit of the stomach, which may be looked upon as the aura of the vagus, precedes; there is a feeling of contraction and oppression of the chest, during which the patient generally seizes hold of a firm object; at times there is nausea, and then attacks of cough supervene, the expiration occurring in jerks, and in more or less rapid succession, introduced or interrupted by a sudden inspiration with a lengthened sound. The respiratory muscles act tumultuously, the abdominal muscles are drawn in and rigid, the trunk is bent forwards. At times there are convulsive movements of the extremities and starting of the whole body. Suffocative attacks are the more violent and threatening the less the patient exhales. The impeded transmission of air through the lungs shows itself in the absence of the vesicular murmur,[2] as well as in the phenomena accompanying a disturbed state of the circulation, viz., lividity of the humid face, congestion of the eyes, and ecchymosis between the conjunctiva and sclerotic, hæmorrhage from the nose, the cavity of the mouth, and the bronchi. The cough is dry, or a little viscid mucus is expectorated with difficulty. After a duration of from two to five minutes the paroxysm, which often consists of two fits, divided by an interval, ceases; it generally terminates with vomiting of bronchial mucus, and of the contents of the stomach, and at times with syncopic exhaustion. After this an interval of *bien aise* ensues.

Taking a general view of the disease we find that it presents a stage of development, a period at which it is at its height, and a stage of subsidence. At the commencement the paroxysms are incomplete, there is no spasmodic contraction of the glottis, nor the sonorous inspiration. As the disease progresses the attacks increase in severity, and become more frequent. The subsidence of the affection is marked by the diminished frequency of the fits, and especially by an increased secretion

[1] Müller's Elements of Physiology, Dr. Baly's translation, vol. i, p. 352.

[2] Laennec; Traité de l'Auscultation Médiate, 4th ed.; Paris, 1837, vol. i, p. 221.

in the bronchi, the peculiar tone and character of the cough often continuing to the end of the disease.

The phenomena of hooping-cough are subject to modification by other morbid processes; the most frequent complication is with catarrh, the complication with inflammation coming next in order. In simple hooping-cough the bronchial mucous membrane is more or less affected; it is only in very young children that the spasmodic form is seen free from every complication. When complicated with catarrh the mucous membrane becomes more intensely and more generally involved. Reddening of the conjunctiva, suffusion of tears, nasal catarrh, with an oppressive pain in the vicinity of the frontal cavities, frequent sneezing, and the discharge of a thin, acrid, serous fluid from the nose, febricitation, scanty urine, accompanied by ischuria; heat alternating with horripilations, show themselves from the commencement and from the introductory symptoms. The cough does not, as yet, present the suffocative character, but it differs from a mere catarrhal cough in occurring at considerable intervals and lasting a long time. The first stage lasts from seven to fourteen days, and according to Lombard's observations, instituted during an epidemic at Geneva, even as much as four and six weeks; the paroxysms then become fully developed. The mucous secretion becomes more copious; the expectoration thicker, purulent, and of a yellowish colour. During the intervals distinct mucous râles may be heard on auscultating different parts of the thorax. The other symptoms of the catarrh cease; after a time the sputa are simply mucous, while the paroxysms of the hooping-cough continue with the same intensity.

When there is an inflammatory complication, whether with bronchitis or pneumonia, during the course of the disease (for sometimes they form its starting point), the free intervals may disappear; a new series of symptoms then arises, viz., permanent acceleration of breathing, dyspnœa, the characteristic symptoms presented by percussion and auscultation, a livid hue of the lips and cheeks, fever, incapacity for exercise and exertion, loss of strength and of the reproductive powers. A change is often perceptible in the fit of coughing when the inflammation is at its height; the spasm of the glottis occurs but rarely, although the expiratory efforts are violent and follow each

other in rapid succession. As the inflammation abates, the sonorous cough returns. In this respect the phlogistic process differs from tubercle; for I have found that even the formation of large cavities presents no arresting influence to the continuance of the croup until death, even after lasting three months and more. The exanthematic process does not exclude pertussis, though Storch [1] has observed it to be arrested during smallpox, and Wall[2] has noticed the same during measles and scarlet fever. In the epidemic of intermittent fever that occurred at Milan in the year 1815, hooping-cough was observed to cease during the ague fits.

Our knowledge of the morbid anatomy of this disease is inconclusive, as we rarely have an opportunity of post-mortem investigation in simple hooping-cough. Antenrieth's[3] observation of inflammation of the vagus, in its course through the thorax, has not been confirmed by others.[4] For a considerable time past, I have directed my attention to the subject of irritation of the vagus in pertussis, by an inflammatory process occurring in the adjoining bronchial glands, and in several cases the cadaveric inspection has confirmed my views. An opportunity but rarely presents itself, of making the examination in the early stages of the disease; but, even during the later periods, I have met with some glands among the hypertrophied and tubercular bronchial glands, of the size of a pea or small bean, with a dark red and congested appearance, from which, on incision, a drop of blood was discharged. In the same way as the energies of the vagus are weakened by compression, they may be stimulated by irritation of neighbouring tissues; and the recurrent nerve which is given off in those parts, is particularly likely to show its participation in the irritation, by a spasmodic affection of the glottis. The rapid formation of dilatation of the bronchi,[5] hypertrophy and tuberculosis of the bronchial glands, which has often fallen under my own obser-

[1] Abhandlung von den Kinderkrankheiten, vol. ii, p. 362.

[2] Treatise on the History, Nature, and Treatment of Chin-Cough; Glasgow, 1813, p. 73.

[3] Tübinger Blätter für Natur und Arzneikunde, vol. i, No. 1.

[4] See Krukenberg's Jahrbücher der Ambulatorischen Klinik in Halle, 1820; and West, Lectures on the Diseases of Infancy and Childhood; London, 1848, p. 277.

[5] See Stokes; a Treatise on the Diagnosis and Treatment of Diseases of the Chest, Part I, p. 155.

vation, collapse and carnification of individual portions of the lungs, of larger or less extent, as first pointed out by Jörg, twenty years ago, frequently occur as secondary changes.[1] The period of childhood, especially from the first to the seventh year, possesses a most undoubted predisposition to hooping-cough; among 159 cases, quoted by Rilliet and Barthez,[2] 132 occurred at this age, and 27 between the ages of 8 and 14. West states, that more than half the number of cases occurs before the end of the third year, after the fifth the frequency diminishes rapidly; and after the tenth, the disease is so rare, that out of 813 cases, only seven were found of a later period of life. Children under six months are rarely attacked. Girls appear to be more frequently affected than boys; West calculates that, while 55·4 per cent. of his cases were girls, 44·6 per cent. were boys; whereas, in the grand total of sick children under his care, the proportion of girls to boys was as 49·1 to 50·9. Among adults, the female sex is more frequently attacked than the male. The disease is often epidemic, but it is by no means so rare to find it occurring sporadically, as some have asserted. Autumn and spring, rapid changes of temperature, and hygrometric conditions of the atmosphere, favour these epidemics, which resemble each other in having a catarrhal basis, but receive a different character from the permanent genius of the locality. Epidemics of measles not unfrequently precede or follow them. In some countries, as Scotland, Sweden, Denmark, the epidemic influences are supposed to prevail. Most writers assume a communication by contagion; a view that is supported by the observations of hooping-cough being communicated by children to nurses or mothers, or of its being transported by affected individuals to districts which had previously been exempt, or of the successive occurrences of the disease in members of the same family, as well as of the fact of the liability to the disease being destroyed by a previous attack. The expired air is stated to be the bearer of the poison, therefore it is advised to avoid the vicinity and contact, and especially kissing sick children. But in

[1] See Alderson, on the Pathology of Hooping-cough, in Medico-Chirurg. Trans., vol. xvi, pp. 78—93, where there is an accurate account of the post-mortem results, though it is misinterpreted as an adhesive inflammation of the pulmonary cells.

[2] Traité Clinique et Pratique des Maladies des Enfants, vol. ii, p. 230.

these matters much is mere hypothesis, and we are as yet without satisfactory scientific proofs. Swallowing solids and liquids, laughing, crying, vexation, alarm, bodily fatigue, and as I have often had opportunities of observing, the power of irritation, serve as occasional exciting causes. If there are several children suffering from hooping-cough in a room, and one begins to cough, the others will probably soon follow. Meltzer asserts, that this happens even when the children are separated from each other in different rooms, so that the cough could only be heard.

The simple disease runs a sluggish course; it may continue for from two to four or six months. During the night, the attacks occur more frequently and violently than by day. Several authors speak of the disease presenting an uniform periodicity and a tertian type, (Rosenstein, Armstrong.) Even the single paroxysms at times occur at stated hours.[1]

The danger is much increased by the supervention of other morbid conditions, for the attack itself only proves fatal exceptionally. Bronchitis and pneumonia very frequently complicate pertussis at the commencement, or during its progress; this may depend either upon the prevailing character of the epidemic, or upon injurious accidental influences. Now that we have the aid of percussion and auscultation, we are enabled to recognise the complications at once, and we no longer run the risk of assuming the presence of inflammatory complications, where they do not exist, as Watts and Marcus[2] have done in their endeavours to demonstrate the identity of pertussis and bronchitis. Tuberculosis is often developed, and passes rapidly through its various stages. Next in order to the lungs, we find the brain and the medulla oblongata most liable to become implicated. Venous congestion, hydrocephalus, less frequently scrophulous meningitis, and convulsions, increase the danger to the utmost; when the former occur, the hooping-cough generally recedes. Occasionally, gastroenteric catarrh, with exhausting diarrhœa, supervenes. Paralysis of the pectoral muscles, and in consequence scoliosis, must be considered as a secondary condition resulting occasionally from pertussis. If

[1] Joseph Frank; Prax. Med. Univ. Præt., vol. ii, p. 831.

[2] Der Keichhusten, über seine Erkenntniss, Natur und Behandlung; Bamberg, 1816.

this form of paralysis affects both sides of the thorax, the latter assumes the shape known as the pigeon-breast; and this may have induced the erroneous assertion, that hooping-cough may lead to rickets. If its occurrence happens to coincide with the period of dentition, weaning, the stage of convalescence from other and especially exanthematous diseases, or chronic diarrhœa, the prognosis becomes more unfavorable. I have observed relapses in several cases after the disease had apparently ceased for some weeks. West has met with cases, in which the hooping-cough, which commenced in spring, made a pause during the summer and reappeared in autumn.

In regard to the *treatment* of hooping-cough, we may boast of an advance, in having learnt to appreciate the therapeutic demands of the complications. It is unnecessary to advert here to the treatment to be pursued against pneumonia and bronchitis; we have only to remark that the presence of hooping cough should form no counter-indication to the administration of antiphlogistic remedies, and especially of the abstraction of blood; the sooner and more effectually they are exhibited, the more speedily the spasmodic character of the attacks, and the integrity of the free intervals will be marked; these phenomena alone are sufficient to disprove the identity of this disease and bronchial inflammation. Nor have the complications alone met with more attention, but it has been also bestowed upon the primitive character of the prevailing epidemic; this not only affords a practical boon to the present generation, but also seems to assist in the critical interpretation of the past. By such means only can we understand the praise bestowed upon Sydenham and Huxham upon venesection, or Stoll's laudation of evacuants. On the other hand, no progress has been made in the treatment of simple pertussis, and crude empiricism has considerably increased the number of remedies recommended. We know of no method by which we can arrest the progress of the disease, or shorten its duration. In vain have physicians tried to act upon the various organic apparatus; we have not even had the negative advantage of finding that certain methods of treatment increase the symptoms. If Marcus advises a strict adherence to the antiphlogistic method, and Lombard[1] promises a cure by the

[1] Bibliothèque Univers. de Genève, 1838, p. 119.

bold exhibition of the carbonate of iron, in from eighteen to thirty-six grains in twenty-four hours, nobody is likely to doubt the tolerance of the human body of medical interference; and we shall be excused from enumerating the various remedies which the manuals and encyclopædias accumulate for the benefit of the tyro.

Remedial agents of a different kind have been resorted to in old times. Thus Thomas Willis, the first to introduce the term tussis convulsiva puerorum for this disease, states, that in his time it was customary to employ fright for the purposes of cure. "Hence," he says, "as drugs are of little avail, it is a common practice among the vulgar to place the patient in a corn-binn in a mill, and let the water-wheel revolve to frighten him with its great noise and an ugly appearance, and this occasionally induces a cure."[1] A change of soil and atmosphere is advised by some writers, though I have not been able to convince myself of the advantages it offers.

RISUS CONVULSIVUS.

The spasmodic laugh depends upon an affection of the spinal nerves which control the expiratory movements; ordinary laughing is also connected with expiration. The diaphragm, to which even Haller[2] ascribes an important part in laughing, takes no part in this function, as it is a muscle of inspiration.

The sound of the laugh varies much in health, and according to the sex and age of an individual; Hamberger[3] states that all men in laughing sound ah and o, females ee and a; in the spasmodic laugh the sound is very loud, while the expression of the features, which depends upon the facial nerve, remains cold. The tone of the mind corresponds to the expression, and contrasts with that accompanying ordinary laughing, by being serious and depressed.

It most frequently originates in reflex irritation. Tickling certain parts of the skin, as the sole of the foot, or armpits,

[1] De Medicamentorum Operationibus in Corpore Humano; Op. Omn. ed. Genev. vol. iii, p. 63.

[2] Element. Physiol. Corp. Hum., vol. iii, p. 305.

[3] Haller; loc. cit.

easily excites the spasm. Its predominance among the female sex, and in hysterical constitutions, is an evidence of its relation to the uterine system. Zwinger[1] communicates a singular case, in which it preceded miliaria, and ceased on the appearance of the eruption. It is occasionally met with in attacks of mania.

A curious observation, and one marked by its great accuracy, in which uncontrollable laughter formed a prominent and permanent feature, has been published by Ulrich in Coblentz, in the 'Medicinische Zeitung des Vereins für Heilkunde in Preussen,' (1835, No. 12.) The following is an abbreviated account of the case:

A young man of 24 years of age had, up to his seventeenth year, often suffered from erysipelas of the face, which had repeatedly been interrupted in its course, and since the last attack of which, his spirits had become materially impaired. About the middle of the year 1830, a slight squint of the left eye, with which he had been affected from childhood, became much more marked; his speech lost its sound, his gait became stiff, he tumbled over his own feet, and, seen at a distance, he appeared to be hopping, as if an effort were necessary to lift his feet. At this time he kept a horse; when he dismounted after a ride, he was often so giddy that he was obliged to catch at support. In January, 1831, the symptoms suddenly became worse, after the patient had been exposed to the influence of great cold in a journey. He had the greatest difficulty in moving his legs, spoke very hastily and unintelligibly, and often laughed unintentionally, which he had never done before. This laughing, which occurred especially during conversation, but sometimes also attacked him in the streets, did not leave him again, and formed the characteristic feature of the disease. The strabismus increased very much from this time, the patient consequently often saw double, and had great difficulty in estimating the distances of objects near him. His hands also lost their strength, and did not grasp so firmly, nor hold what he had taken hold of. The paralysis of the legs increased during the year 1831, and contact with the large toes, or stepping, often caused an unpleasant cramp in the extensor muscles. In February, 1832, a tertian ague

[1] Acta Helvetica, 1750.

seized him, during which all the paralytic symptoms became more prominent. After the ague had subsided, the patient was no longer able to leave the room, and could only walk a few steps while assisting himself with his hands. Deglutition and expectoration became more difficult, and the involuntary laughing increased. Sleep and appetite continued satisfactory, the memory tenacious, and the mental powers were rather increased than diminished: the same was the case with the senses; the sense of touch was remarkably fine throughout the entire cutaneous covering, consequently the patient was extremely sensitive to contact. The acuteness of the senses and of touch continued until death. At times there was headache, and more particularly on the left side of the occiput; this was also accompanied by tinnitus of the left ear. One day in May, 1832, after his siesta, a fever paroxysm seized him, with violent retching and vomiting, complete paralysis of the limbs, and a retraction of the head backwards, which was excessively annoying to the patient, so that he indicated by signs that he wished his head held forwards. Consciousness continued unimpaired. This paroxysm also yielded to appropriate remedies, though it evidently indicated an exacerbation of the disease, for, from this time, universal spasms supervened, in which the patient stretched his limbs, and bent his head backwards. These spasms were the most violent in the morning on rising. Towards the end of summer he was no longer able to move his feet, the hands refused their services altogether, and the patient had to be fed. His speech became more unintelligible, deglutition more difficult, the involuntary laugh increased very much, and broke out whenever a movement was arrested; the spasms of the limbs became more frequent. The patient all the time remained calm and joyful, enjoyed society, and liked to occupy himself with objects of art.

On the 25th of October another fever paroxysm occurred, and soon after there was complete paralysis of all the voluntary muscles. The muscles of the eyes continued to preserve their independence the longest. The patient in his utter speechlessness could only make himself understood by having the letters of the alphabet repeated, and winking as the letters were pronounced that composed the word required. The lower jaw hung down; the lips could not be closed; and it was with the

greatest trouble that any beverages could be administered to him. Consciousness continued unimpaired up to a few hours before death, which took place on the 28th of October.

Ulrich assumed from the above symptoms that the seat of disease lay in the medulla oblongata, and especially in the anterior strands of the cord.

An oblong projection, of the size of a French bean, was noticed at the lower surface of the right half of the medulla oblongata; a little higher up a similarly coloured, though much smaller, tumefaction was observed. These two brownish eminences, which differed in a marked manner from the rest of the healthy medulla, extended as far as the posterior side of the pons Varolii, which was also in part morbidly affected. The degeneration of the pons Varolii was most marked on the left side, extended forward about half way through the pons, and formed a perceptible elevation; on the right side the degeneration did not extend beyond four lines from the posterior margin.

The bean-sized projection on the right side of the medulla oblongata was invested by the arachnoid, which was easily detached from it. The subjacent brown mass was of a gelatinous consistency, and passed, below and laterally, gradually into the healthy tissue of the spinal cord, without a definite boundary. In the middle fissure of the medulla oblongata a more healthy, less altered, though still somewhat discoloured, portion of medullary tissue was found intervening between the two projections. On a more minute examination of these eminences, they proved to be the degenerated pyramids and olivary bodies. On cutting into the morbid tissue, the degeneration of the pyramids was traceable to five or six lines below the surface; on the right side, however, it penetrated deeper than on the left, and deeper in the pyramids than in the olivary bodies. The restiform bodies, excepting a trifling discoloration where they met the olivary bodies, were perfectly normal. The dura mater, where it covered the basilar groove of the occipital bone, presented two strongly reddened spots, which looked as if they had been subjected to pressure, and corresponded to the eminences on the medulla oblongata. The roots of the spinal accessory, the hypoglossus, the vagus, and the glosso-pharyngeal of the right side, were remarkably red,

but not thickened. The roots of the facial, acoustic, and abducens were more coloured on the left side. The aquæduct of Sylvius and the fourth ventricle were much distended, and the calamus scriptorius was double its usual length and breadth. The spinal cord was normal.

The laughing spasm alternates with other respiratory spasms, and especially with fits of crying and screaming. When very intense and of long duration, it has been found to terminate fatally. Of this Haller quotes instances, and a modern case is given by Reydellet.[1]

[1] Dict. des Sciences Médic., vol. xlix, p. 38.

CHAPTER XIV.

VOCAL SPASMS.

Spasmodic conditions of the vocal movements present a twofold expression: the voice is either interrupted or it has an abnormal sound.

The arrest of the voice is either absolute (aphonia,) or it shows itself in a definite relation to articulate speech, (ischnophonia, Mogilalia.) As a rule, the convulsive origin of aphonia is less frequent than the paralytic. It is evidenced by its short duration; by associating with other convulsive movements, especially of the muscles of deglutition and respiration; and by the frequent alternation and rapid transition to the normal condition.

In order to pronounce individual sounds or syllables, it is necessary that the muscular apparatus of the larynx, and of its tubular prolongation to the buccal opening, should co-operate. In a man who had a deep wound in the neck, Bell[1] observed that whenever he made an attempt to speak, which he could only do in a whisper, the glottis moved harmoniously with the lips. In a patient who had lost the bones of the upper part of his face, the velum palati was exhibited in a constant state of action while he was talking; when he uttered explosive consonants it rose, and drew back forcibly when the lips separated, or the tongue was removed from the palate or the teeth.[2] Derangements of sonorous speech arise from an abnormal motor impulse, and from disturbances of the coordination of the numerous nervous functions of the vagus, the hypoglossus, and facialis An interruption of the voice in pronouncing single sounds or syllables is termed stuttering. It generally occurs when a consonant is combined with a vowel at the commencement or in the middle of a word,

[1] On the Organs of the Human Voice, in the third edition of the Nervous System, 1844, p. 484.

[2] Loc. cit., p. 488.

sometimes also when an attempt is made to pronounce a single letter. The preceding sound or syllable is repeated in explosive sounds, (b, d, g, k,) until the impediment has yielded. This is not done where the sound is continuous, (f, s, r.) Sometimes the column of air is violently forced through the rima glottidis without producing a sound. Other spasmodic phenomena, in the range of the respiratory, irritative, and articulating movements, associate themselves with temporary aphonia. Expiration is more or less impeded; the inspiratory muscles of the neck and thorax are much agitated; the facial muscles are distorted; the eyelids open and close forcibly; the alæ nasi play; the lips jerk up and down; and the tongue is forced in spasmodic snatches against the upper or lower row of teeth. The clonic spasm sometimes passes into one of a tonic character; the voice is silenced; the mouth closes firmly; the tongue softens; the face becomes crimson; and the veins are swollen. The patient is in a state approaching to suffocation until the spasm is relaxed, and the sounds are again given forth. The convulsive obstacle only occurs in sonorous speech; there is no difficulty in articulating if the individual confines himself to a whisper.

It is this that essentially distinguishes stuttering from *stammering*, which consists in an inaptitude, an impediment to the articulating movements, and with which it is frequently confounded, although Arnott,[1] and after him Schulthess[2] and Müller,[3] have given physiological reasons for assuming closure of the glottis as a condition of stuttering. Stuttering does not, however, always occur as a simple affection, but may be complicated with affections of a spasmodic character, and others; it is met with associated with strabismus and chorea.

The male sex has by far the greater predisposition to stuttering. Colombat[4] asserts, that one person in 2500 stutters, but that only one woman in 20,000 is affected. Childhood and youth peculiarly predispose to it; it is rare before the fourth year, it increases from the seventh to the fifteenth, so that one

[1] Elements of Physic, or Natural Philosophy.

[2] Das Stammeln und Stottern; Zürich, 1830.

[3] Elements of Physiology, Dr. Baly's translation, vol. ii, p. 1054.

[4] Traité de tous les Vices de la Parole et en particulier du Bégaiement, 3d ed., 1840, p. 263.

seventh of the whole number belongs to this period of life. Old age carries with it a spontaneous cure of stuttering; it is frequent to meet with hereditary predisposition; two fifths of the cases mentioned by Colombat asserted that it was a family failing. Intestinal irritation, the development of puberty, exhausting, especially spermatic, discharges, mental emotions, and irritation, have been observed to cause the complaint. The atmosphere exerts an occasional influence upon stuttering, many persons have a presentiment of atmospheric changes, in the greater difficulty of articulating; dryness of the air in summer and winter favours its occurrence. Nothing is more apt to increase it than embarrassment, timidity, expectation, while it is diminished, or ceases as soon as the individual affected is left alone, or in the dark, or puts on a mask. It occasionally remains in abeyance during the course of other diseases. There is an undeniable reflex action upon the mind, for stutterers are irritable and shy.

In the *treatment*, too little regard has of late been given to the cause, while undue attention has been paid to the gymnastics of the tongue, the inutility and even risk of medical dilettantism have been fully displayed in this matter.[1] According to the requirements of the individual case, local or general abstraction of blood, or tonic stimulants, the use of cold or of sea-baths, are indicated; no treatment has been followed by more satisfactory results than the exhibition of purgatives; even obstinate cases have yielded to this system, of which a remarkable instance is related by Bostock:[2] whenever in this case the stuttering returned, it was removed by the employment of purgatives combined with a strictly antiphlogistic diet. Greater expectations have been raised by a psychical cure, whether by withdrawing the attention to other subjects, or by fixing the will upon the process of articulation, or by a threat of punishment, than have been realised. Arnott, on the strength of his own views regarding the seat of stuttering, advised that the temporary closure of the glottis should be prevented, by intoning the voice between the individual words, *e. g.* by inter-

[1] See Dr. Lichtinger; über Orthophonie und Orthoepie, oder über Heilung der Stimm- und Sprach-fehler; Berlin, 1840.

[2] History of a Case of Stammering successfully treated by a long-continued use of Cathartics, in Med.-Chir. Trans., vol. xvi, p. 72.

posing an e; a suggestion to which he may also have been led by observing that stuttering ceases in singing. Müller is of opinion that the same theory of maintaining the glottis open, may be more appropriately realized by accompanying the articulation by a constant intonation. The reading lessons are not to contain any mute consonants, b, d, g, p, t, k, but merely sentences with vowels and consonants, capable of an accompanying intonation, f, x, sh, s, r, l, m, n, u; they are to be articulated with intonation, and to be drawn out very long. The writings of Colombat and Lichtinger contain other statements and propositions, for which we must refer the reader to their works. The curative influence of rhythm in stammering is of considerable interest; even uniform rhythmic inspiration is useful; it is well known that there is no stammering in singing: we may therefore assume that it is a result of the musical character of their language that the Chinese and Cochin Chinese have no stammerers; in their language, a large number of words possess a different signification, according to the six modulations of the voice with which they are uttered. Colombat had a young man from Cochin China under his care, whose father was a Frenchman, and his mother a native; and who only stammered when he spoke French, while he expressed himself fluently in the language of his country. It is essential for the cure, to speak in time; cases have been observed, in which not only stammering, but also coexisting spasms of the facial muscles and chorea were removed by rhythmic exercise. The surgical treatment introduced by Dieffenbach, of dividing the root of the tongue, and removing a uniform horizontal portion, has been very properly abandoned.

The spasmodic affection of the vocal nerves is manifested not alone by an interruption, but also by an abnormal pitch of the voice.

Too little attention has hitherto been paid to alterations of the voice in nervous diseases, especially in those of a nervous character. It may be affected in regard to force, to compass, to purity, or timbre, and either permanently so or temporarily. We have the most frequent opportunity of convincing ourselves of this fact in hysteria and epilepsy; it is apparent in ordinary

speaking, but is more marked in singing. There are also spasmodic affections of those muscles which serve to stretch the chordæ vocales; and by this means peculiar sounds are produced, that rise and fall in the scale without intervals, as in howling and screaming, or are associated with movements of the lips and even of the tongue, and thus receive a hissing or clacking accompaniment.

Vocal spasms occur chiefly in the female sex, at the period of puberty, during amenorrhœa, in hysterical or epileptic constitutions; the epileptic attack frequently commences with a loud fearful scream. Vocal spasms take place almost exclusively during waking; they make short intermissions, and have a great tendency to relapse, and to associate themselves, or alternate with other respiratory spasms, as spasm of the glottis, sobbing, sneezing, coughing, and eructations.[1]

Five and twenty years ago, in consultation with my late friend, Dr. Heim, I attended a young lady, who while awake uttered sounds which closely resembled the noise of a saw mill, and were so loud that they could be heard on the staircase; they occurred every ten minutes, and were accompanied by very considerable exertion of the respiratory muscles. In speaking, the voice was normal. Bell was consulted on account of a young lady of fifteen, who uttered a convulsive barking noise, in which the larynx alone was affected, and in which the harmonious action of pharynx, the velum palati, and the lips, was wanting. Sometimes she had a natural cough in the intervals of her attacks, but this cough did not prevent the return of the disagreeable harsh sound, which she uttered ten times in the course of a minute; during sleep it ceased, but it recurred instantly upon waking. It persisted for four weeks, and returned in three successive winters.

A peculiar combination of vocal spasm with other nervous affections was presented to me in the person of a medical gentleman, of 60 years of age, from Russia, who, in 1846, applied to me for advice. His health had become impaired since the first cholera epidemic in 1830, during which he had been exposed to much cold and fatigue. The first symptoms

[1] See Gairdner; Appendix to a former Paper on Anomalous Affections of the Respiratory Organs, in Edin. Med. and Surg. Journal, July, 1842, p. 77.

were a painful spasm in the muscles of the back of the neck, with a creaking noise in the upper cervical vertebræ. Asthmatic attacks following any emotional affections, after meals, or the use of spirituous liquors, ensued. In August, 1844, while passing a night in a bivouac, he caught a violent cold, and was attacked a few weeks after by a histrionic spasm of both halves of the face, with which he remained affected from that time. Spasm at the entrance of the gullet and of the trachea supervened. During the attack, the patient presented the appearance of a person choking; his forehead was deeply furrowed, the eyelids were firmly closed, the lips pointed like a funnel, and the cheeks were laid in deep folds. When the mouth was inspected, the velum palati was seen drawn down by the spasmodic action of the constrictor isthmi faucium, superior and inferior, and the uvula had almost disappeared, owing to the spasm of the arygos uvulæ. After a long inspiration, a short jerking expiration ensued, accompanied by a loud roar, which could be heard all over the house. The spasm thus remitted for a short time in order to recommence with a fresh inspiration. He was a long time going to sleep, but when he had done so, the spasms ceased, soon to return on waking up. Music exercised an almost magical effect; as soon as he heard it the spasm was allayed, but it ceased directly when he played the violin,—an instrument which, therefore, was always by his side; his face at once, if ever so much distorted by the spasm, assumed a calm, joyful expression, and the pharyngeal spasm vanished. A strong resolution and pleasing impressions shortened the paroxysms, and rendered them less violent. A few whiffs of tobacco, drawing a cord tightly round the neck, and pressure exerted upon the xiphoid process of the sternum, produced a similar effect. After the removal of the hypertrophied tonsils, which my late friend, Professor Dieffenbach, undertook at my request, the attacks ceased for a few days. The convulsive affection was associated with an anæsthesia of the lower extremities, the skin was perfectly insensible to all irritants, and it was only by deep pricks into the muscles that sensation was excited. While the rest of the body was in a state of profuse perspiration, the legs remained cold and dry. The skin of the trunk and of the upper extremities was less sensitive than in the normal state; motility continued unimpaired; the arms

and legs were emaciated. The disease had resisted all the remedies of the most varied character hitherto employed.

Such cases as the one just detailed excepted, the *prognosis* of vocal spasm is favorable. When we have assured ourselves against mystification and exaggeration, on the part of the patient, for females will even coquet with their spasms, we must expect the most benefit from derivation to the intestinal canal and the skin. Gairdner gives the preference to the application of a blister to the back of the neck. The good effects of cold affusion, of the douche, the moxa, have been frequently observed; the mere threatened application of the last remedy has occasionally produced a favorable change.

END OF VOL. I.

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